Solutions to the 2009 EA-2A Exam

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ABOUT THIS MANUAL

The solutions in this manual represent the author's interpretation of the correct method of solving each of the questions from the 2009 EA-2A examination. The solutions follow the rules of ERISA and the Internal Revenue Code as of June, 30, 2009. In addition, the solutions follow the rules found in proposed regulations for IRC section 430, which were included in the syllabus for the exam.

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Solutions to EA-2(A) Examination
Fall, 2009

Question 1

IRC section 430(g)(4)(A) requires that for years beginning after 2008, receivable contributions must be included in the value of assets, interest adjusted from the date paid back to the valuation date using the effective interest rate for the **preceding** plan year. Therefore, the 1/1/2010 value of assets must include the 4/1/2010 receivable contribution discounted with interest using the 2009 plan effective rate, not the 2010 plan effective rate. The statement is false.

Answer is B.

Question 2

A plan is exempt from creating a new shortfall amortization base under IRC section 430(c)(5) if the ratio of the actuarial value of assets (reduced by the entire prefunding balance if the plan sponsor elects to use any portion of the prefunding balance to reduce the minimum required contribution for the year) to the funding target is at least 100%. There is a transition rule under IRC section 430(c)(5)(B) that allows the 100% to be replaced by 96% for 2010. However, this transition rule is not available if the plan was not in effect prior to 2008. This plan was established in 2008, so the transition rule does not apply. The statement is false because the 96% should actually be 100%.

Answer is B.

Question 3

The quarterly contribution that is required to be made under IRC section 430(j)(3) is determined based upon the minimum required contributions for the current and immediately prior year. A frozen plan does not necessarily have a minimum required contribution of $0, so it is not necessarily true that no quarterly contribution is required. There is no exemption of the quarterly contribution requirement under IRC section 430(j)(3) for frozen plans. The statement is false.

Answer is B.

Question 4

IRC section 4971(a)(2) states that the initial excise tax for a multiemployer plan upon failure to meet the minimum funding requirement is 5% (not 10%). The statement is false.

Answer is B.

Question 5

IRS regulation 1.417(e)-1(d)(10) provides rules dealing with the interaction of actuarial assumptions under IRC section 417(e)(3) and the anti-cutback rules of IRC section 411(d)(6). This regulation makes it clear that the anti-cutback rules do apply to IRC section 417(e)(3) when there is an amendment changing the applicable interest rate, the timing of determining the applicable interest rate, and the applicable mortality table. In particular, IRS regulation 1.417(e)(3)-1(d)(10)(ii) states that if the timing of the determination of the interest rate is changed by plan amendment, then the distribution must be determined as the larger of the result using the old rules and the new rules for a limited period of time. This must be done for the next year from the date that the amendment becomes effective.

In the plan described in this question, the look-back month has been changed from four months to one month. The stability period is the calendar year, so for all distributions in 2010, the applicable interest rate has been changed from the rate in effect on September, 2009 to the rate in effect on December, 2009. Any distribution in 2010 must be based upon the greater of the result using the September, 2009 interest rate and the December, 2009 interest rate. The statement is true.

Answer is A.

Question 6

A plan in critical status generally cannot be amended to increase benefits during the rehabilitation period. However, IRC section 432(f)(1)(B) allows a plan to be amended (including to increase future benefit accruals) as long as the actuary certifies that the increase will be paid out of additional contributions not contemplated by the rehabilitation plan, and that this will not negatively impact the plan emerging from critical status on schedule. The statement is false.

Answer is B.

Question 7

There is no requirement that the "applicable month" under IRC section 430(h)(2)(E) be the same as the look-back month used under IRC section 417(e)(3). The statement is false.

Answer is B.

Question 8

A plan is at-risk for a year if **all** of the following are true:

1. The plan has more than 500 participants on any day of the preceding year
2. The funding target for the preceding plan year, determined as if the plan was not at-risk, is less than 80% (75% in the case of the 2010 year), and
3. The funding target for the preceding plan year, determined as if the plan was at-risk, is less than 70%.

In 2009, the first and third conditions are satisfied, but the second condition is not satisfied because the not at-risk funding target for 2009 is 78% (more than 75%) – and the plan is therefore not at-risk for 2010. The statement is false.

See IRC sections 430(i)(4) and 430(i)(6).

Answer is B.

Question 9

Contributions for a plan year that are deposited after the valuation date are discounted from the date deposited back to the valuation date using the plan effective rate for the year (IRC section 430(j)(2). The interest adjusted contribution for 2010 is:

$700{,}000 \div 1.06^{20.5/12} = 633{,}676.$

The funding deficiency for 2010 is determined as of the valuation date, equal to the difference between the minimum required contribution and the interest adjusted contribution:

$900{,}000 - 633{,}676 = 266{,}324$

The excise tax imposed on the plan sponsor is 10% of the funding deficiency (IRC section 4971(a)(1)).

Excise tax = $10\% \times 266{,}324 = 26{,}632$

The statement is false.

Answer is B.

Question 10

The quarterly contribution requirement is equal to 25% of the smaller of 100% of the minimum required contribution for the prior year (2009) or 90% of the minimum required contribution for the current year (2010). See IRC section 430(j)(3)(D).

Since the plan has been frozen since 1999, the target normal cost is equal to $0 for each of 2009 and 2010 (no increase in the accrued benefit). There are also no shortfall amortization bases in the 2009 valuation because the funding target attainment percentages for 2008 and 2009 are more than the transition percentages under IRC section 430(c)(5)(B)(ii) of 92% and 94%, respectively. So the minimum required contribution for 2008 is $0, which results in no quarterly contribution payments required for 2010.

The statement is true.

Answer is A.

Question 11

The prefunding balance is adjusted from one valuation date to the next using the actual asset rate of return for the year (IRC section 430(f)(8)). This is the definition of Y in this question.

Answer is B.

Question 12

Disability assumptions should be based upon tables that most closely relate to the disability provisions in the plan (see the discussion of disability rates on page 23 of the SOA study note "Assessment and Selection of Actuarial Assumptions"). The assertion is true.

If the definition of disability under the plan is more liberal than the definition under Social Security, then more people would be eligible for disability under the plan than under Social Security. Those additional people would likely be healthier than those eligible under both Social Security and the plan. The reason is true, and it is the correct reason to support the assertion.

Answer is A.

Question 13

The demographics of a group may change when a plan is spun-off from a larger plan. As a result, the assumptions used to value the spun-off plan may be different from that of the original plan, and the expected experience of the spun-off plan may be different from that of the original plan.

Both the assertion and the reason are false statements.

Answer is E.

Question 14

The change in the asset valuation method does not have an impact on the target normal cost, so that can be ignored in this question. The amount of the shortfall amortization base is impacted by the change in the asset method, so the shortfall amortization base for 2010 must be determined.

No shortfall amortization base is required if the funding target is no more than the actuarial value of the assets (reduced by the total prefunding balance, as long as at least part of the prefunding balance is elected by the plan sponsor to be used to reduce the minimum required contribution for the year). For the 2010 year, the transition rule of IRC section 430(c)(5)(B) allows the use of 96% of the funding target for this purpose. (Note that the transition rule is not available for plans that became effective after 2007. In this question, the plan effective date is not given, so it must be assumed that the effective date is prior to 2008. In addition, it can be assumed that the plan sponsor elects to reduce the minimum required contribution by the prefunding balance for 2010 as this is a general condition of the exam.)

96% of the funding target = 96% × 980,000 = 940,800

Based upon the actuarial value of assets before the method change, the actuarial value of assets less the prefunding balance is 945,000 (955,000 – 10,000). Since this is not less than 96% of the funding target, there is no new shortfall amortization base required for 2010. Note that there are no existing shortfall amortization bases from prior years, since the funding target attainment percentage was 100% for 2009, resulting in early deemed amortization of any existing bases as described in IRC section 430(c)(6).

Based upon the actuarial value of assets after the method change, the actuarial value of assets less the prefunding balance is 930,000 (940,000 – 10,000). Since this is less than 96% of the funding target, there is a new shortfall amortization base required for 2010. The base is equal to the excess of 96% of the funding target over the actuarial value of the assets (reduced by both the funding standard carryover balance and the prefunding balance). The shortfall installment is equal to the shortfall base amortized over 7 years.

2010 shortfall amortization base = 940,800 – (940,000 – 10,000 – 10,000) = 20,800

2010 shortfall installment = 20,800/5.9574 = 3,491

The only difference in the valuation using the two different asset values under the method change is the 2010 shortfall installment of 3,491. This is the increase in the minimum required contribution (and, in turn, the smallest amount that satisfies the minimum funding standard) for 2010.

Answer is B.

Question 15

The target normal cost is equal to the present value of the difference between the 12/31/2010 accrued benefit (taking into account the 3% expected salary increase for 2010) and the 1/1/2010 accrued benefit (ignoring the expected salary increase for 2010).

1/1/2010 accrued benefit = 3% × \$90,000 × 10 years of service = \$27,000
12/31/2010 accrued benefit = 3% × \$90,000 × 1.03 × 11 years of service = \$30,591

In determining the present value, the segment interest rates must be used. Smith is 45 as of 1/1/2010. The segment 3 interest rate is applicable for all benefit payments which will not begin for 20 years, at age 65 (age 65 is the assumed retirement age under the general conditions of the exam).

$$\text{Target normal cost}_{1/1/2010} = (30{,}591 - 27{,}000) \times \ddot{a}^{(12)}_{65@7\%} \times v^{20}_{7\%}$$
$$= 3{,}591 \times 8.00 \times 0.258419 = 7{,}424$$

The funding target is equal to the present value of the 1/1/2010 accrued benefit.

$$\text{Funding target}_{1/1/2010} = 27{,}000 \times \ddot{a}^{(12)}_{65@7\%} \times v^{20}_{7\%} = 27{,}000 \times 8.00 \times 0.258419 = 55{,}819$$

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets (unreduced by any credit balance items). The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. This projected funding target based on assumed future compensation increases is:

Projected 1/1/2010 accrued benefit = 3% × \$90,000 × 1.03^{20} × 10 years of service
= 48,765

$$\text{Projected funding target}_{1/1/2010} = 48{,}765 \times \ddot{a}^{(12)}_{65@7\%} \times v^{20}_{7\%}$$
$$= 48{,}765 \times 8.00 \times 0.258419 = 100{,}814$$

Cushion amount = (50% × 55,819) + (100,814 – 55,819) = 72,905

The IRC section 404(o)(2)(A) deductible limit is:

7,424 + 55,819 + 72,905 – 60,000 = 76,148

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets. The at-risk assumptions apply to plans where participants could elect to receive benefits earlier than the assumed retirement age, or can elect to receive more valuable benefits than the form assumed for funding the plan. The exam general conditions state that there are no optional forms of benefit and that the assumed retirement age is 65, with no other optional earlier ages at which benefits can be received. As a result, there is no difference between the at-risk assumptions and the not at-risk assumptions in this question.

The IRC section 404(o)(2)(B) deductible limit is:

$$7{,}424 + 55{,}819 - 60{,}000 = 3{,}243$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is 76,148.

Answer is D.

Note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the last day of the plan year. Without regulations, it is not clear whether the 76,418 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if 76,418 is given interest at the plan effective rate (not known in this question, but between 5% and 7%) to the end of the year, the answer still falls within the same answer range.

Question 16

In addition to the change in normal cost due to the change in the interest rate, the amortization of the existing amortization bases must be re-amortized using the new interest rate (resulting in a change in the minimum required contribution), and a new amortization base must be established due to the new interest rate and amortized using the new interest rate.

The outstanding balance of the bases in effect prior to the change in interest rate must be determined. The only amortization base in effect prior to 1/1/2010 was the experience gain credit base established on 1/1/2009 (reflecting the 2008 experience gain). The amortization credit for this base on 1/1/2009 was $80,000, and as of 1/1/2010 there are 14 years left to amortize it (all amortization bases created in 2008 or later are 15-year bases under IRC section 431). The outstanding balance of that base as of 1/1/2010 (using the old interest rate of 7.5%) is:

Outstanding balance of 2008 gain = $80,000 × $\ddot{a}_{\overline{14}|.075}$ = $80,000 × 9.125840 = $730,067

This is re-amortized over the remaining 14 years using the new 7% interest rate.

Amortization credit on 1/1/2010 = $730,067/$\ddot{a}_{\overline{14}|.07}$ = $730,067/9.357651 = $78,018

The amortization credit is reduced by $1,982 ($80,000 - $78,018).

Next, we must consider the 2009 experience loss of $150,000. This is determined before any change of interest rate. The amortization (15 years) of this base at each of the two interest rates is:

At 7%: $150,000/$\ddot{a}_{\overline{15}|.07}$ = $150,000/9.745468 = $15,392

At 7.5%: $150,000/$\ddot{a}_{\overline{15}|.075}$ = $150,000/9.489154 = $15,808

The amortization charge is reduced by $416 ($15,808 - $15,392).

Finally, a new amortization base is created due to the change in interest rate. This base is the $200,000 increase in the accrued liability, and is amortized over 15 years under IRC section 431.

$200,000/$\ddot{a}_{\overline{15}|.07}$ = $200,000/9.745468 = $20,522

The increase in the minimum required contribution for 2010 as of 1/1/2010 is:

Increase in normal cost + Decrease in amortization credit from 2008 gain – Decrease in amortization charge from 2009 loss + Amortization of new base
= $18,000 + $1,982 - $416 + $20,522 = $40,088

Answer is C.

Question 17

Smith is receiving a lump sum payment on 11/1/2009. This falls within the stability period that begins on 10/1/2009 (the stability period is a calendar quarter). The look-back month for the stability period is July, 2009 (3 months prior to the first day of the stability period). In July, 2009, the value of $\ddot{a}_{65}^{(12)}$ is 11.93. Smith is 65 on 1/1/2009. The lump sum payable to Smith is:

$1,000 × 12 × 11.93 = $143,160.

Answer is E.

Question 18

Treasury regulation 1.401(a)(17)-1(b)(4) states that in the case of a multiple employer plan, any employee who is employed by more than one of the employers in a year is to have the compensation limitation under IRC section 401(a)(17) applied separately to each employer. The compensation for Smith that is impacted by the compensation limit of IRC section 401(a)(17) is:

2006 compensation from Employer A is limited to $220,000
2007 compensation from Employer A is limited to $225,000
2009 compensation from Employer C is limited to $245,000
2010 compensation from Employer C is limited to $260,000

The compensation history (after application of 401(a)(17)) for Smith is:

Year	Employer A	Employer B	Employer C	Total
2005	$153,000	$123,500		$276,500
2006	220,000	45,500		265,500
2007	225,000	84,000		309,000
2008	175,000	150,000		325,000
2009			245,000	245,000
2010			260,000	260,000

The accrued benefit for Smith as of 12/31/2010 is:

1% × ($276,500 + 265,500 + 309,000 + 325,000 + 245,000 + 260,000) = $16,810

Answer is D.

Question 19

A plan is eligible to use the funding standard carryover balance and the prefunding balance to offset the minimum required contribution only if the ratio of the actuarial value of assets (reduced by the prefunding balance) to the funding target as of the prior year's valuation date is at least 80% (IRC section 430(f)(3)(C)). As of 1/1/2009, this ratio is:

$$\frac{\$25{,}500{,}000 - \$950{,}000}{\$25{,}000{,}000} = 98.2\%$$

The plan is eligible to use the funding standard carryover balance and the prefunding balance to offset the minimum required contribution for 2010. Statement I is a true statement.

A plan is exempt from establishing a shortfall amortization base for a year if the actuarial value of assets (reduced by the prefunding balance only if the employer elects to reduce the minimum required contribution by all or part of the balance) is at least as large as the funding target as of the current year's valuation date (IRC section 430(c)(5)(A)). However, for the 2010 plan year, the transition rule of IRC section 430(c)(5)(B) allows the use of only 96% of the funding shortfall for purposes of this comparison. As of 1/1/2010:

Actuarial value of assets less prefunding balance = \$32,400,000 - \$1,100,000
= \$31,300,000
96% of funding target = 96% × \$32,500,000 = \$31,200,000

The plan is exempt from creating a shortfall amortization base for 2010 because \$31,300,000 exceeds \$31,200,000. Statement II is true.

A plan is exempt from the quarterly contribution requirement of IRC section 430(j)(3) if there was no funding shortfall as of the prior year valuation date. The funding shortfall (as defined in IRC section 430(c)(4))) is equal to the excess (if any) of the funding target over the actuarial value of the assets (reduced by both the funding standard carryover and prefunding balances). The funding shortfall as of 1/1/2009 is:

\$25,000,000 – (\$25,500,000 - \$1,250,000 - \$900,000) = \$1,650,000

The plan is subject to the quarterly contribution requirement for 2010 because there was a funding shortfall as of 1/1/2009. Statement III is true.

Answer is D.

Question 20

A multiemployer plan is considered to be in endangered status if either the plan's funded percentage is less than 80% for the plan year or the plan has an accumulated funding deficiency for the plan year or is expected to have an accumulated funding deficiency for any of the 6 subsequent plan years (IRC section 432(b)(1)). Although the plan's funded percentage (ratio of actuarial assets reduced by the credit balance to the accrued liability) is 82% (820,000/1,000,000), the plan is expected to have a funding deficiency in 2016 (the 6^{th} year following the current year). The multiemployer plan is thus considered to be endangered in 2010.

Answer is A.

Question 21

Treasury regulation 1.417(e)-1(d)(1) states that the present value of any distribution must not be less than the amount calculated using the minimum IRC section 417(e) actuarial assumptions. Regulation 1.417(e)-1(d)(6) provides the following exceptions to the minimum present value requirement:

(1) The benefit does not decrease during the life of the participant (or the life of the participant's spouse, in the case of a QPSA).
(2) The benefit decreases during the life of the participant only because of the death of the survivor annuitant (provided that the reduction does not exceed 50%).
(3) The benefit decreases because of the cessation or reduction of a Social Security supplement or qualified disability benefit.

The only <u>two</u> optional forms of payment listed in this question that do not fall under one of the above exceptions are the lump sum option and the Social Security level income option. Note that the Social Security level income option is not the same as a Social Security supplement. The level income form of benefit reduces by the amount of Social Security payments upon commencement of those Social Security payments. Since the benefit paid by the plan is reduced at that point, this constitutes a decrease during the life of the participant, so the form of benefit is subject to IRC section 417(e).

Answer is B.

Question 22

Smith's compensation must be limited to the IRC section 401(a)(17) maximum for each year. Treasury regulation 1.401(a)(17)-1(b)(3)(ii) indicates that for plans using compensation based on consecutive 12-month periods (as is the case here with the 36-month average), compensation for each 12-month period is limited to the annual compensation limit using the limit in effect as of the first day of the 12-month period. The 12-month periods representing the high consecutive 36-month period are 11/1/2005 – 10/31/2006, 11/1/2006 – 10/31/2007, and 11/1/2007 – 10/31/2008. Using the table provided with the exam, Smith's compensation history and limitation history is:

Period	Salary	401(a)(17) limitation
11/1/05 – 10/31/06	(17,500 × 2) + (18,000 × 10) = 215,000	210,000
11/1/06 – 10/31/07	(18,000 × 2) + (18,250 × 10) = 218,500	220,000
11/1/07 – 10/31/08	(18,250 × 2) + (19,500 × 10) = 231,500	225,000

Smith's high consecutive 36-month average compensation (limiting each year's salary to the IRC section 401(a)(17) maximum) is:

$$\frac{\$210{,}000 + \$218{,}500 + \$225{,}000}{3} = \$217{,}833$$

Answer is A.

Question 23

The quarterly contribution that a plan is required to pay under IRC section 430(j)(3) (D) is equal to 25% of the smaller of:

(1) 90% of the current year minimum required contribution, or
(2) 100% of the prior year minimum required contribution.

The quarterly contribution requirement applies to plans with a funding shortfall for the preceding plan year (IRC section 430(j)(3)(A)). This requirement applies in this question since the 1/1/2009 funding target attainment percentage is 89% (less than 100%). The minimum required contribution for purposes of the quarterly contribution requirement is determined without application of any reduction for the funding standard carryover and prefunding balances (proposed Treasury regulation 1.430(j)-1(c)(3)(iii)).

The minimum required contribution for each year is equal to the sum of the target normal cost and the shortfall amortization charges.

2009 minimum required contribution = $100,000 + 50,000 = $150,000
2010 minimum required contribution = $110,000 + 55,000 = $165,000
90% of the 2010 minimum required contribution = 90% × $165,000 = $148,500
The quarterly contribution requirement for 2010 is: 25% × $148,500 = $37,125

If the employer elects to use the funding standard carryover balance (and/or the prefunding balance) to reduce the minimum required contribution for the year on or before the quarterly contribution due date, then the funding standard carryover balance (increased with interest using the plan effective rate for the year) can be used to reduce the quarterly contribution that must be paid (proposed Treasury regulation 1.430(j)-1(c)(1)(ii)). In this question, on 3/1/2010 the plan sponsor makes an election to use the funding standard carryover balance to reduce the minimum required contribution. This is prior to the 4/15/2010 quarterly contribution due date, so the 2010 funding standard carryover balance of $5,100, increased with interest to 4/15/2010 at the 6.6% plan effective interest rate, can be used to pay for part of the quarterly contribution requirement.

Funding standard carryover balance on 4/15/2010 = $5,100 × $1.066^{3.5/12}$ = $5,196

The quarterly contribution of $X paid on 4/15/2010 is equal to the difference between the quarterly contribution requirement and the interest-adjusted funding standard carryover balance.

$X = $37,125 – 5,196 = $31,929

Answer is D.

Question 24

I. IRC section 430(h)(1) states that the actuarial assumptions and methods for a single employer plan must each be reasonable and, in combination, provide the actuary's best estimate of anticipated experience under the plan. The statement is true.

II. There are two additional actuarial assumptions under IRC section 430(i)(1)(B) that must be used for at-risk plans. These assumptions are:

(1) All employees not assumed to retire on the valuation date but who would be eligible to elect benefits within the 11 year period beginning on the valuation date must be assumed to retire at the earliest date on which they would be eligible to elect benefits, and
(2) All employees must be assumed to elect the most valuable form of benefit available at the assumed retirement age.

These are not assumptions chosen by the actuary, so the statement is false.

III. IRC section 430(h)(5) deals with approval of changes in actuarial assumptions for certain underfunded plans. Specifically, the IRC section states that IRS approval is required for all assumption changes if the unfunded vested benefits using PBGC assumptions exceeds $50,000,000 **and** that the change in assumptions results in a decrease in the funding shortfall below a certain dollar threshold. Since the statement does not provide information concerning any decrease in the funding shortfall, the statement is false (as it is not true that the assumption change **must** be approved by the IRS).

Answer is E.

Question 25

The frozen initial liability cost method consists of a normal cost and various amortization charges and credits. The amortization bases generally consist only of an initial accrued liability determined under the entry age normal method (generally amortized over 30 years for plans effective prior to 2008). However, if there have been changes in actuarial assumptions or plan amendments, those changes result in a new amortization base equal to the increase or decrease in the entry age normal accrued liability. For bases created prior to 2008, they are amortized over 30 years; for bases created after 2007, they are amortized over 15 years.

The initial accrued liability is given to be $700,000. In addition, there is a plan amendment for 2010, resulting in a new amortization base. The entry age normal accrued liability as of 1/1/2010 prior to the plan amendment is $2,000,000. The benefits have been increased by $5 per month (from $40 to $45), so the increase in the accrued liability due to the plan amendment is:

$2,000,000 × (5/40) = $250,000

The normal cost under the frozen initial liability cost method is equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets - Unfunded liability}}{\text{Temporary annuity}}$$

The actuarial value of assets is not reduced by the credit balance for purposes of the normal cost determination.

The unfunded liability has not been provided; however, it can be determined using the balance equation:

Unfunded liability = Outstanding balance – Credit balance

The outstanding balance of an amortization base is the amount remaining as of the current valuation date. The initial liability of $700,000 was established on 1/1/2000, and is being amortized over 30 years. Therefore, there are 20 years left to amortize it as of 1/1/2010.

$$\text{Outstanding balance} = \$700{,}000 \times \frac{\ddot{a}_{\overline{20}|}}{\ddot{a}_{\overline{30}|}} = \$700{,}000 \times \frac{11.335595}{13.277674} = \$597{,}613$$

Unfunded liability = $597,613 – 40,000 = $557,613

The additional accrued liability due to the plan amendment of $250,000 must be added to the unfunded liability, bringing the total to $807,613.

The temporary annuity is equal to the present value of future service to the number of active participants:

Temporary annuity = 1,250/100 = 12.5

The normal cost is equal to:

$$\frac{\$3{,}600{,}000 - 1{,}400{,}000 - 807{,}613}{12.5} = \$111{,}391$$

The minimum required contribution as of 1/1/2010 is equal to the normal cost plus the amortization charges.

$$\text{Minimum required contribution} = \$111{,}391 + \frac{\$700{,}000}{\ddot{a}_{\overline{30}|}} + \frac{\$250{,}000}{\ddot{a}_{\overline{15}|}}$$

$$= \$111{,}391 + 52{,}720 + 25{,}653 = \$189{,}764$$

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the credit balance.

Smallest amount that satisfies the minimum = $189,764 – 40,000 = $149,764

Answer is B.

Question 26

The asset gain or loss is equal to the difference between the actual asset value and the expected asset value. The expected assets are determined by the adjusting the prior asset value and the receipts (contributions) and disbursements (benefit payments and administrative costs) for the prior year at the valuation interest rate to the current valuation date.

Expected $\text{assets}_{1/1/2010} = (2{,}300{,}000 \times 1.07) + 600{,}000 = 3{,}061{,}000$

2009 asset loss = 3,061,000 – 2,900,000 = 161,000

The total gain or loss is equal to the difference between the actual unfunded accrued liability and the expected unfunded accrued liability. (Unfunded accrued liability is equal to the difference between the accrued liability and the asset value.) The expected unfunded accrued liability is determined by adding the prior year unfunded liability and the prior normal cost, increasing the total with interest for the prior year at the valuation interest rate to the current valuation date, and reducing the result with the prior year contributions (adjusted for interest from the date contributed to the current valuation date).

Expected $\text{UAL}_{1/1/2010} = [(3{,}500{,}000 + 425{,}000 – 2{,}300{,}000) \times 1.07] – 600{,}000$
$= 1{,}138{,}750$

Actual $\text{UAL}_{1/1/2010} = 4{,}250{,}000 – 2{,}900{,}000 = 1{,}350{,}000$

2009 total loss = 1,350,000 – 1,138,750 = 211,250

Ratio of asset loss to total loss = 161,000/211,250 = 76.213%

Answer is C.

Question 27

The target normal cost is equal to the present value of the difference between the 12/31/2010 accrued benefit (taking into account the 5% expected salary increase for 2010) and the 1/1/2010 accrued benefit (ignoring the expected salary increase for 2010).

1/1/2010 accrued benefit = 2.5% × \$100,000 × 16 years of service = \$40,000
12/31/2010 accrued benefit = 2.5% × \$100,000 × 1.05 × 17 years of service = \$44,625

In determining the present value, the segment interest rates must be used. Smith is 44 as of 1/1/2010. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2010 through 2014), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2015 through 2029), and the segment 3 interest rate is used for the remaining payments (2030 and later). Since Smith's first benefit payment will be at age 65 on 1/1/2031, the segment 3 interest rate of 7% is applicable for all benefit payments. The target normal cost is:

$$\text{Target normal cost}_{1/1/2010} = (44{,}625 - 40{,}000) \times \ddot{a}^{(12)}_{65@7\%} \times v^{21}_{7\%}$$
$$= 4{,}625 \times 8.00 \times 0.241513 = 8{,}936$$

The funding target is equal to the present value of the 1/1/2010 accrued benefit:

$$\text{Funding target}_{1/1/2010} = 40{,}000 \times \ddot{a}^{(12)}_{65@7\%} \times v^{21}_{7\%} = 40{,}000 \times 8.00 \times 0.241513 = 77{,}284$$

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by both the pre-funding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2010 is:

$$\text{Funding shortfall}_{1/1/2010} = 77{,}284 - (72{,}000 - 5{,}800) = 11{,}084$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2010 (the $77,284 funding target exceeds the $72,000 actuarial value of assets). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is not the case in this question, since exam general condition 36 states that, unless otherwise indicated, the plan has never been subject to IRC section 412(l). So, applying the transition rule, 96% of the funding target is $74,193 (96% of $77,284), which still exceeds the actuarial value of the assets, so the new funding shortfall amortization base is required. The base is equal to the excess of 96% of the funding target over the actuarial value of the assets (reduced by both credit balance items).

2010 shortfall amortization base = 74,193 - (72,000 – 5,800) = 7,993

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$\text{Minimum}_{1/1/2010}$ = Target normal cost + Amortization of funding shortfall
= $8,936 + ($7,993/5.9982)
= $10,269

The smallest amount that satisfies the minimum funding standard (X) for 2010 is equal to the minimum, reduced by the credit balance items (note that it is assumed that the employer is eligible to use the credit balance items and elects to do so per exam general conditions 30 and 31).

X = 10,269 – 5,800 = 4,469

Answer is B.

Question 28

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets (unreduced by any credit balance items). The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. It is given that the deductible limit is determined based upon the plan year that ends within the fiscal year. The valuation results from the 1/1/2009 valuation (2009 calendar plan year) are used to determine the deductible limit for the fiscal year ending on 1/31/2010.

The plan is a flat benefit plan that has always provided the same $25 flat benefit, so there is no increase in the funding target taking into account future compensation increases. The deductible limit is:

Target normal cost + Funding target + Cushion amount – Actuarial assets
= 81,000 + 100,000 + (50% × 100,000) – 100,000 = 131,000

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets.

The IRC section 404(o)(2)(B) deductible limit is:

86,000 + 110,000 – 100,000 = 96,000

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is 131,000.

Answer is C.

Note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the earlier of last day of the plan year or the last day of the fiscal year. Without updated regulations, it is not clear whether the 131,000 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if 131,000 is given interest at the plan effective rate to the end of the year, the answer still falls within the same answer range.

Question 29

The fair market of assets must be adjusted to include receivable contributions for the prior year (2009), discounted with interest from the date contributed to the asset valuation date using the prior year (2009) plan effective interest rate (IRC section 430(g)(4)).

$$\text{Adjusted fair market value}_{1/1/2010} = \$9{,}000{,}000 + (\$100{,}000/1.056^{3/12}) + (\$200{,}000/1.056^{8/12}) = \$9{,}291{,}512$$

The actuarial value of assets cannot exceed 110% of the fair market value of assets (IRC section 430(g)(3)(B)(iii)). Therefore, the upper limit on the actuarial value of assets is:

$\$9{,}291{,}512 \times 110\% = \$10{,}220{,}663$

Answer is C.

Question 30

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2010 is:

$$\text{Funding shortfall}_{1/1/2010} = \$2{,}200{,}000 - (\$2{,}050{,}000 - \$20{,}000) = \$170{,}000$$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2010 (the $2,200,000 funding target exceeds the $2,030,000 actuarial value of assets, reduced by the pre-funding balance – note that it is assumed that the employer uses the prefunding balance to reduce the minimum required contribution per the general conditions of the exam). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is not the case in this question, since exam general condition 36 states that, unless otherwise indicated, the plan has never been subject to IRC section 412(l). So, applying the transition rule, 96% of the funding target is $2,112,000 (96% of $2,200,000), which still exceeds the actuarial value of the assets after reduction of the pre-funding balance, so the new funding shortfall amortization base is required. The base is equal to the excess of 96% of the funding target over the actuarial value of the assets (reduced by both credit balance items), less the outstanding balance of the prior shortfall amortization bases.

The outstanding balance of the 1/1/2009 shortfall amortization base must be determined using the segment interest rates used for the 2010 valuation (see IRC section 430(h)(2)(C)).

Outstanding balance of 1/1/2009 shortfall amortization base on 1/1/2010

$= \$25{,}000 \times 5.2932 = \$132{,}330$

2010 shortfall amortization base = $2,112,000 - ($2,050,000 - $20,000) - $132,330
= <$50,330>

Note that the new 2010 shortfall amortization base is negative.

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases.

$\text{Minimum}_{1/1/2010}$ = Target normal cost ± Amortization of funding shortfall bases
= $42,000 + $25,000 - ($50,330/5.9982) = $58,609

Note that the definition of the minimum required contribution in the exam general conditions states that it is not reduced by the credit balance items.

Answer is C.

Question 31

Under the unit credit method, the minimum required contribution is equal to the sum of the normal cost and the amortization charges and credits associated with the various amortization bases. The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution less the credit balance.

The normal cost at the 2010 assumed interest rate of 7.5% is given to be $1,000.000.

There are 4 amortization bases to be used in the 2010 valuation. These are the bases previously established on 1/1/2008 and 1/1/2009, a 2009 experience gain or loss base, and a new base due to the change in the interest assumption equal to the increased accrued liability as a result of the reduction from 8% to 7.5%.

The new amortization base (to be amortized over a period of 15 years under IRC section 431(b)(2)(B)(iv)) is:

$22,500,000 - $20,000,000 = $2,500,000

The outstanding balance of the bases from the prior valuations is amortized over the respective remaining periods using the new 7.5% interest rate. The outstanding balance is equal to the product of the 1/1/2009 amortization charge and the annuity due for the remaining period as of 1/1/2010 using the old 8% interest rate. These outstanding balances are:

$54,088 × $\ddot{a}_{\overline{14}|.08}$ = $54,088 × 8.903776 = $481,587

$44,925 × $\ddot{a}_{\overline{13}|.08}$ = $44,925 × 8.536078 = $383,483

The 2009 experience loss is equal to the difference between the expected and actual unfunded accrued liabilities. The actual unfunded accrued liability is equal to the difference between the accrued liability (at the old 8% interest rate – an experience gain or loss is always determined before any changes in actuarial assumptions) and the actuarial value of assets (unreduced by any credit balance).

Actual unfunded accrued liability$_{1/1/2010}$ = $20,000,000 - $19,500,000 = $500,000

The expected unfunded liability can be determined using the balance equation:

Unfunded liability = Outstanding balance - Credit balance

Note that the outstanding balance includes only amortization bases that existed as of the prior valuation date (1/1/2009), and the outstanding balance and the credit balance is determined as of the current valuation date (1/1/2010).

Expected unfunded liability$_{1/1/2010}$ = ($481,587 + $383,483) - $75,000 = $790,070

The actual liability is less than the expected liability, so there is an experience gain.

2009 experience gain = $790,070 - $500,000 = $290,070

The gain is amortized over a period of 15 years (IRC section 431(b)(3)(B)(ii)).

The minimum required contribution can now be determined for 2010.

$$\text{Minimum required contribution} = \$1{,}000{,}000 + \frac{\$2{,}500{,}000}{\ddot{a}_{\overline{15}|.075}} - \frac{\$290{,}070}{\ddot{a}_{\overline{15}|.075}} + \frac{\$481{,}587}{\ddot{a}_{\overline{14}|.075}} + \frac{\$383{,}483}{\ddot{a}_{\overline{13}|.075}}$$

$$= \$1{,}000{,}000 + \$263{,}459 - \$30{,}569 + \$52{,}772 + \$43{,}900$$

$$= \$1{,}329{,}562$$

The smallest amount that satisfies the minimum funding standard ($X) is equal to the minimum required contribution less the credit balance.

$X = $1,329,562 - $75,000 = $1,254,562

Answer is B.

Question 32

The mortality gain or loss for 2010 (as of 1/1/2011) is equal to the difference between the expected liability and the actual liability. The payments for the first 4 years (prior to age 69) are guaranteed, so there is no gain or loss with respect to those payments. Only the deferred life annuity payable beginning at age 69 must be considered.

The expected liability can be determined by taking the actual liability as of 1/1/2010, reducing it by the expected benefit payments, and then increasing the result with interest to 1/1/2011. (Note that there is no mortality adjustment from 1/1/2010 to 1/1/2011 – the mortality was already taken into account in the determination of the present value as of 1/1/2010.) There are no expected benefit payments in 2010 since we are looking only at the deferred life annuity portion of the benefit, so the present value of the deferred annuity as of 1/1/2010 is simply increased with 7% interest to get the expected value as of 1/1/2011.

1/1/2010 present value = 100 retirees × \$2,000 × (N_{69}/D_{65})
= 100 retirees × \$2,000 × (74,340/10,981) = \$1,353,975

1/1/2011 expected liability = \$1,353,975 × 1.07 = \$1,448,753

The actual liability is based upon the participants actually still alive as of 1/1/2011 (99 participants). Again, the guaranteed payments are ignored.

1/1/2011 actual liability = 99 retirees × \$2,000 × (N_{69}/D_{66})

The value of D_{66} is not provided in the data. However, it is possible to develop this from first principles. Recall that $D_x = v^x l_x$. Also note that $p_{65} = 1 - q_{65} = 1 – 0.011 = 0.989$.

Taking the ratio of D_{66} and D_{65}:

$D_{66}/D_{65} = (v^{66}l_{66})/(v^{65}l_{65}) = vp_{65} = (1/1.07) \times 0.989 = 0.924299$

Since $D_{65} = 10{,}981$, $D_{66} = D_{65} \times 0.9243 = 10{,}981 \times 0.924299 = 10{,}150$

Now it is possible to determine the actual liability:

1/1/2011 actual liability = 99 retirees × \$2,000 × (N_{69}/D_{66})
= 99 retirees × \$2,000 × (74,340/10,150) = \$1,450,179

Since the actual liability exceeds the expected liability, there is a loss equal to the difference:

Loss = \$1,450,179 - \$1,448,753 = \$1,426

Answer is B.

Notes: In a question such as this with very tight answer ranges considering the size of the liabilities, it can be very dangerous to round intermediate numbers. In the above solution, I rounded the value of D_{66}. The actual value is 10,149.728. Using that value, the actual liability is \$1,450,218, a difference of only \$39, but a large difference considering that the end points of the answer ranges are only \$100 apart. It turns out that the answer to the question using the actual value is \$1,465, still in answer range B. Care should be taken when rounding intermediate numbers in exam questions.

Note that rounding would not have played a part in the solution if the actual liability were determined more directly, by simply accumulating the liability for the remaining 99 retirees from 1/1/2010 to 1/1/2011 using both interest and mortality (to take into account that they actually did not die):

1/1/2011 actual liability = 99 retirees × \$2,000 × (N_{69}/D_{65}) × 1.07 ÷ p_{65}
= 99 retirees × \$2,000 × (74,340/10,981) × 1.07 ÷ 0.989
= \$1,450,218

Question 33

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2010 (the $1,000,000 funding target exceeds the $978,000 actuarial value of assets, reduced by the pre-funding balance – note that the prefunding balance is 0 in this question). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is not the case in this question, since exam general condition 36 states that, unless otherwise indicated, the plan has never been subject to IRC section 412(l). So, applying the transition rule, 96% of the funding target is $960,000 (96% of $1,000,000), which is less than the actuarial value of the assets, so no shortfall amortization base is required. In addition, there were no shortfall amortization bases in prior years, so the minimum required contribution consists only of the target normal cost of $50,500.

The smallest amount that satisfies the minimum funding standard ($X) is equal to the minimum required contribution reduced by the funding standard carryover balance and prefunding balance, to the extent that the employer elects to use them. The general conditions of the exam state that unless information is provided to the contrary, the employer elects to use the credit balance items to reduce the minimum required contribution.

$X = $50,500 - $5,000 = $45,500

Answer is A.

Question 34

The accrued benefit for a non-key employee in a top heavy plan is equal to the greater of the plan benefit formula accrued benefit or the top heavy minimum accrued benefit. The top heavy minimum accrued benefit under IRC section 416(c)(1) is equal to 2% of the highest consecutive 5-year average compensation per year of participation in the plan for years that the plan is top heavy.

Smith was hired on 1/1/1997 and has 13 years of service with the employer as of 1/1/2010. The plan has been top heavy every year since 2002, so Smith has 8 top heavy years of plan participation.

Smith's 5-year average compensation is:

$$\frac{\$48{,}000 + \$51{,}000 + \$54{,}000 + \$57{,}000 + \$60{,}000}{5} = \$54{,}000$$

Plan formula accrued benefit = 1% × $54,000 × 13 years of service = $7,020

Top heavy minimum accrued benefit = 2% × $54,000 × 8 top heavy years = $8,640

The accrued benefit is the greater of the two benefits, $8,640.

Answer is B.

Question 35

The aggregate cost method has no amortization bases but simply a normal cost. The normal cost is equal to:

$$NC = \frac{PVFB - AVA}{Temporary\ annuity}$$

PVFB = present value of future benefits
AVA = actuarial value of assets, reduced by the credit balance
Temporary annuity = Ratio of present value of future compensation to total compensation

Using the data provided,

$$NC_{1/1/2010} = \frac{\$2{,}500{,}000 - (\$570{,}000 - \$25{,}000)}{\$15{,}000{,}000 / \$1{,}000{,}000} = \$130{,}333$$

The minimum required contribution as of 12/31/2010 (increasing the normal cost with interest using the 6% valuation interest rate to the end of the year) is:

$$\text{Minimum required contribution}_{12/31/2010} = \$130{,}333 \times 1.06 = \$138{,}153$$

The smallest amount that satisfies the minimum funding standard ($X) is equal to the minimum required contribution reduced by credit balance. Note that the credit balance must also be increased with interest to the end of the year.

$$\$X = \$138{,}153 - (\$25{,}000 \times 1.06) = \$111{,}653$$

Answer is D.

Question 36

The experience gain or loss with regard to the assets is equal to the difference between the expected and actual actuarial value of assets (AVA). The actual AVA as of 1/1/2010 is given to be $1,200,000. The expected AVA can be developed from the AVA as of 1/1/2009, adjusting the 2009 value and the actual contributions and benefit payments with expected interest using the valuation interest rate of 6%. This adjustment can be done either using simple or compound interest (you should end up in the same answer range either way). This solution will use compound interest.

$$\text{Expected AVA}_{1/1/2010} = (\$1{,}000{,}000 \times 1.06) + (\$200{,}000 \times 1.06^{9/12}) - (\$100{,}000 \times 1.06^{6/12})$$
$$= \$1{,}165{,}978$$

There is a gain since the actual assets exceed the expected assets.

2009 asset gain = $1,200,000 - $1,165,978 = $34,022

Answer is D.

Question 37

The high 5-year average salary (with the 2009 salary limited to the 2009 IRC section 401(a)(17) limit of $245,000) is:

$$\frac{\$170{,}000 + \$200{,}000 + \$190{,}000 + \$200{,}000 + \$245{,}000}{5} = \$201{,}000$$

Smith entered the plan on 1/1/2005, and has 5 years of plan participation as of 12/31/2009. The accrued benefit for Smith under the plan's benefit formula is:

$\text{Accrued benefit}_{12/31/2009}$ = 10% × $201,000 × 5 years of participation = $100,500

This cannot exceed the limitation of IRC section 415(b). The 415(b) limit is equal to the smaller of the dollar limit and the compensation limit. The compensation limit is 100% of the high consecutive 3-year average salary, reduced by 1/10 for each year of service with the employer less than 10 years. Smith has 6 years of service with the employer, so the compensation limit is:

$$\frac{\$190{,}000 + \$200{,}000 + \$245{,}000}{3} \times 6/10 = \$211{,}667 \times 6/10 = \$127{,}000$$

The dollar limit for 2009 is equal to $195,000. This is reduced by 1/10 for each year of plan participation less than 10 years. Smith has 5 years of plan participation, so the dollar limit is:

$195,000 × 5/10 = $97,500

The overall 415(b) limit is $97,500. This is less than the plan benefit, and is the maximum that can be accrued by Smith as of 12/31/2009.

Answer is A.

Note that the dollar limit of IRC section 415(b) is reduced for retirement prior to age 62 and increased for retirement after age 65. In addition, both the dollar limit and compensation limit are adjusted for forms of benefit other than a life annuity or a qualified joint and survivor annuity. The general conditions of the exam state that unless you are told otherwise, the retirement age is 65 and the form of benefit is a life annuity. No further adjustment needs to be made to the 415(b) limit in this question.

Question 38

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. In situations where the benefit formula is not compensation based, the increase in the funding target is based upon the average increase in the dollar amount of the benefit formula over the previous 6 years due to plan amendments. The formula has not been amended during the past 6 years, so no increase in the funding target is taken into account. Since the plan is not at-risk (general condition of the exam, since the question does not state at-risk status), the funding target ($1,100,000) and target normal cost ($90,000) without regard to the at-risk assumptions are used.

The cushion amount is:

$$\text{Cushion amount} = 50\% \times \$1{,}100{,}000 = \$550{,}000$$

The IRC section 404(o)(2)(A) deductible limit is:

$$\$90{,}000 + \$1{,}100{,}000 + \$550{,}000 - \$900{,}000 = \$840{,}000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets. These are the target normal cost and funding target using at-risk assumptions.

The IRC section 404(o)(2)(B) deductible limit is:

$$\$100{,}000 + \$1{,}300{,}000 - \$900{,}000 = \$500{,}000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is $840,000.

Answer is D.

Note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the earlier of last day of the plan year or the last day of the fiscal year. Without updated regulations, it is not clear whether the $840,000 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if $840,000 is given interest at the plan effective rate to the end of the year, the answer still falls within the same answer range.

Question 39

The funding target is equal to the present value of the 1/1/2010 accrued benefit. Under a cash balance plan, the accrued benefit is simply the account balance. However, it must be accumulated to retirement age (65) using the plan's future interest crediting rate in order to get a value at retirement age, and that amount is then discounted back to the valuation date in order to get the present value for funding purposes.

Smith will not have 5 years of service until reaching retirement age 65, so the pre-retirement death benefit does not apply. As a result, the mortality decrement must be used to discount the 1/1/2010 accrued benefit for purposes of determining the funding target.

In determining the present value, the segment interest rates must be used. Smith is 61 as of 1/1/2010. The cash balance account is deemed to be a lump sum, payable in 4 years, so the segment 1 interest rate (5%) is used to determine the present value.

$$\text{Funding target}_{1/1/2009} = \$200{,}000 \times 1.06^4 \div 1.05^4 \times {}_4p_{61}$$
$$= \$200{,}000 \times 1.262477 \div 1.215506 \times 0.98237 = \$204{,}066$$

Answer is D.

Question 40

Mortality tables based upon individual annuities are typically not considered appropriate for retirement plan funding since the mortality rates are typically too low as a result of the individual selection process (see page 11 of the SOA study note "Assessment and Selection of Actuarial Assumptions for Measuring Pension Obligations"). Therefore, Table A would generally not be an appropriate table to use for minimum funding purposes. Statement I is false.

Mortality tables based upon group annuities are generally more appropriate for retirement plan funding, according to the study note, as it would have higher rates of mortality than the individual table. So, Table A would generally have **lower** rates of mortality than Table B. Statement II is false.

Mortality based upon the general population of the United States would include the mortality for low income population which would be more at-risk than those populations looked at by insurance companies in determining individual and group mortality tables. As a result, the mortality rates based upon the general population of the United States would be expected to be larger than the mortality from a group table (Table C generally would have higher rates of mortality than Table B). Statement III is true.

Answer is D.

Question 41

The benefit formula for 2010 has increased by $5 per month per year of service. The funding target is based upon the accrued benefit as of the first day of the plan year. Smith has 35 years of service as of 1/1/2010.

Increase in accrued benefit = $5 × 35 years = $175

The increase in the funding target due to the plan amendment is equal to the present value of the increase in the 1/1/2010 accrued benefit. It is assumed that there is a 40% chance that Smith will retire at age 62 with an unreduced accrued benefit (since Smith has at least 30 years of service) and a 60% chance of retirement at age 65.

In determining the present value, the segment interest rates must be used. Smith is 62 as of 1/1/2010. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2010 through 2014), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2015 through 2029), and the segment 3 interest rate is used for the remaining payments (2030 and later). The increase in the funding target is equal to the sum of the increase attributable to retirement at age 62 and the increase attributable to retirement at age 65.

$$\text{Increase}_{1/1/2010}\ (\text{age } 62) = 40\% \times \$175 \times 12 \times \left[\frac{N^{(12)}_{62@seg1} - N^{(12)}_{67@seg1}}{D_{62@seg1}} + \frac{N^{(12)}_{67@seg2} - N^{(12)}_{82@seg2}}{D_{62@seg2}} + \frac{N^{(12)}_{82@seg3}}{D_{62@seg3}} \right]$$

$$= \$840 \times \left[\frac{5{,}755 - 3{,}758}{457} + \frac{1{,}847 - 257}{254} + \frac{114}{142} \right]$$

$$= \$9{,}603$$

$$\text{Increase}_{1/1/2010}\ (\text{age } 65) = 60\% \times \$175 \times 12 \times \left[\frac{N^{(12)}_{65@seg1} - N^{(12)}_{67@seg1}}{D_{65@seg1}} v^3_{seg1} + \frac{N^{(12)}_{67@seg2} - N^{(12)}_{82@seg2}}{D_{65@seg2}} v^3_{seg2} + \frac{N^{(12)}_{82@seg3}}{D_{65@seg3}} v^3_{seg3} \right]$$

$$= \$1{,}260 \times \left[\frac{4{,}487 - 3{,}758}{386} v^3_{.05} + \frac{1{,}847 - 257}{208} v^3_{.06} + \frac{114}{113} v^3_{.07} \right]$$

$$= \$11{,}180$$

Note that since there is no preretirement mortality assumption, the present value at age 65 must be discounted for 3 years with interest only for the assumed retirement age of 65.

Total increase in funding target = $9,603 + $11,180 = $20,783

Answer is B.

Question 42

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the pre-funding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2010 is: $3,400,000 – $2,970,000 = $430,000

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total pre-funding balance if the employer elects to use any part of it to reduce the minimum contribution requirement, but not reduced by the funding standard carryover balance) is at least as large as the funding target. That is not the case as of 1/1/2010 (the $3,400,000 funding target exceeds the $2,970,000 actuarial value of assets – there is no prefunding balance). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is the case in this question, so the transition rule is not available, and a new shortfall amortization base must be created. The base is equal to the excess of the funding target over the actuarial value of the assets (reduced by both credit balance items), less the outstanding balance of the prior shortfall amortization bases.

The outstanding balance of the 1/1/2008 and 1/1/2009 shortfall amortization bases must be determined using the segmented interest rates used for the 2010 valuation (see IRC section 430(h)(2)(C)).

Outstanding balance of 1/1/2008 shortfall amortization base (5 years remaining to amortize) on 1/1/2010 = $30,000 × 4.5460 = $136,380

Outstanding balance of 1/1/2009 shortfall amortization base (6 years remaining to amortize) on 1/1/2010 = $25,000 × 5.2932 = $132,330

2010 shortfall amortization base = $430,000 - $136,380 - $132,330 = $161,290

The minimum required contribution is equal to the sum of the target normal cost and the amortization of the shortfall amortization bases (the prior year amortization installments are not re-amortized using 2010 segment interest rates).

$\text{Minimum}_{1/1/2010}$ = Target normal cost + Amortization of funding shortfall bases
= $80,000 + $30,000 + $25,000 + ($161,290/5.9982) = $161,890

Answer is C.

Question 43

The asset gain or loss is equal to the difference between the actual asset value and the expected asset value. The expected assets are determined by the adjusting the prior asset value and the receipts (contributions) and disbursements (benefit payments and administrative costs) for the prior year at the valuation interest rate (7.0%) to the current year valuation date. The actual assets are determined by making the same adjustments using the actual rate of return (5.5%).

$$\begin{aligned}\text{Expected assets}_{1/1/2010} &= (900{,}000 \times 1.07) + (35{,}000 \times 1.07^{9/12}) + (35{,}000 \times 1.07^{6/12}) \\ &\quad + (35{,}000 \times 1.07^{3/12}) + 35{,}000 - (60{,}000 \times 1.07^{6/12}) \\ &= 963{,}000 + 36{,}822 + 36{,}204 + 35{,}597 + 35{,}000 - 62{,}064 \\ &= 1{,}044{,}559\end{aligned}$$

$$\begin{aligned}\text{Actual assets}_{1/1/2010} &= (900{,}000 \times 1.055) + (35{,}000 \times 1.055^{9/12}) + (35{,}000 \times 1.055^{6/12}) \\ &\quad + (35{,}000 \times 1.055^{3/12}) + 35{,}000 - (60{,}000 \times 1.055^{6/12}) \\ &= 949{,}500 + 36{,}434 + 35{,}950 + 35{,}472 + 35{,}000 - 61{,}628 \\ &= 1{,}030{,}728\end{aligned}$$

Note that simple interest could have been used rather than compound interest – there is no requirement to use one or the other.

The asset loss (since the actual assets are less than the expected assets) is:

2009 asset loss = 1,044,559 – 1,030,728 = 13,831

The normal cost under the aggregate cost method is equal to:

$$\frac{\text{Present value of future benefits - Actuarial value of assets}}{\text{Temporary annuity}}$$

The question is asking for the increase or decrease in the normal cost due to the asset gain or loss. Since there is an asset loss, the normal cost will increase. Based upon the above normal cost formula, the asset loss is amortized using a temporary annuity. This temporary annuity is equal to the ratio of the present value of future compensation to total compensation.

The increase in the normal cost is:

$$\frac{13{,}831}{3{,}250{,}000/150{,}000} = 638$$

Answer is B.

Question 44

The minimum required contribution for a single employer plan is generally equal to the sum of the target normal cost, the shortfall amortization installments, and any waiver amortization installments (IRC section 430(a)(1)).

The target normal cost for 2010 is equal to the present value of the difference between the 12/31/2010 accrued benefit and the 1/1/2010 accrued benefit. Since each annual accrual is equal to \$75 per month of benefit, that is the 2010 increase in the accrued benefit.

In determining the present value, the segment interest rates must be used. Smith is 57 as of 1/1/2010. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2010 through 2014), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2015 through 2029), and the segment 3 interest rate is used for the remaining payments (2030 and later). Since Smith's first benefit payment will be at age 65 (the normal retirement age according to the general conditions of the exam) on 1/1/2018, the segment 2 interest rate of 5% is used to discount benefit payments made from 1/1/2018 through 12/31/2029, and the segment 3 interest rate of 6% is applicable for all benefit payments in 2030 and later. The target normal cost is:

$$\begin{aligned}\text{Target normal cost}_{1/1/2010} &= \$75 \times 12 \times \left[\frac{N^{(12)}_{65@seg2} - N^{(12)}_{77@seg2}}{D_{65@seg2}} v^{8}_{seg2} + \frac{N^{(12)}_{77@seg3}}{D_{65@seg3}} v^{8}_{seg3} \right] \\ &= \$900 \times \left[\frac{44{,}770 - 12{,}564}{3{,}838} v^{8}_{.05} + \frac{5{,}750}{2{,}073} v^{8}_{.06} \right] \\ &= \$6{,}678\end{aligned}$$

Note that it is assumed that there are no preretirement decrements according to the general conditions of the exam.

The funding target is equal to the present value of the 1/1/2010 accrued benefit. Smith has 2 years of service as of 1/1/2010, so the accrued benefit is \$150 (\$75 × 2 years).

$$\begin{aligned}\text{Funding target}_{1/1/2010} &= \$150 \times 12 \times \left[\frac{N^{(12)}_{65@seg2} - N^{(12)}_{77@seg2}}{D_{65@seg2}} v^{8}_{seg2} + \frac{N^{(12)}_{77@seg3}}{D_{65@seg3}} v^{8}_{seg3} \right] \\ &= \$1{,}800 \times \left[\frac{44{,}770 - 12{,}564}{3{,}838} v^{8}_{.05} + \frac{5{,}750}{2{,}073} v^{8}_{.06} \right] \\ &= \$13{,}356\end{aligned}$$

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2010 is:

Funding shortfall$_{1/1/2010}$ = \$13,356 – (\$10,000 – \$200) = \$3,556

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total prefunding balance if the employer elects to use any part of it to reduce the minimum contribution requirement) is at least as large as the funding target. For 2010, the employer is not eligible to use any of the prefunding balance to reduce the minimum required contribution because the funding target attainment percentage for the prior year (2009) is less than 80% (75% in this case). See IRC section 430(f)(3)(C).

The plan is not exempt from setting up a new shortfall amortization base for 2010 since the funding target (\$13,356) exceeds the actuarial value of assets (\$10,000). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available for plans that became effective after 2007 (see IRC section 430(c)(5)(B)(iii)), so there is no transition available for this plan.

The 2010 shortfall amortization base is equal to the funding shortfall, reduced by the outstanding balance of any prior year shortfall amortization bases.

There was no shortfall amortization base in 2008 because Smith, the sole participant, had no service prior to 2008, and the 1/1/2008 funding target was therefore equal to \$0. The shortfall amortization base in 2009 was equal to the 1/1/2009 funding shortfall of \$1,600. This was amortized over a period of 7 years using the 2009 segment interest rates. The amortization of the 2009 shortfall base is:

\$1,600/5.9982 = \$267

The amortization of the base remains the same each year, even though the segment rates may change. However, the outstanding balance of the base is determined each year based upon the current year segment rates. As of 1/1/2010, there are 6 years remaining to amortize the 2009 shortfall base. The outstanding balance as of 1/1/2010 is:

\$267 × 5.4134 = \$1,445

2010 shortfall amortization base = 2010 funding shortfall
– outstanding balance of 2009 shortfall base
= $3,556 - $1,445 = $2,111

The 2010 shortfall amortization base is amortized over 7 years using the 2010 segment rates.

$2,111/6.1596 = $343

Minimum required contribution$_{1/1/2010}$ = $6,678 + $267 + $343 = $7,288

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution reduced by the credit balance items, to the extent that they are elected to be used by the employer. As previously mentioned, in 2010 the employer is not allowed to use any of the prefunding balance to reduce the minimum required contribution.

X = $7,288

Answer is C.

Question 45

The deductible limit for a single employer plan under IRC section 404(o)(2)(A) is equal to the sum of the funding target, the target normal cost, and the cushion amount, with the sum being reduced by the actuarial value of assets. The cushion amount under IRC section 404(o)(3)(A) is equal to the sum of 50% of the funding target plus the increase in the funding target if future compensation increases were taken into account. Since the plan is not at-risk (general condition of the exam, since the question does not state at-risk status), the funding target ($400,000) and target normal cost ($50,000) without regard to the at-risk assumptions are used.

The cushion amount is:

$$\text{Cushion amount} = (50\% \times \$400{,}000) + \$65{,}000 = \$265{,}000$$

The IRC section 404(o)(2)(A) deductible limit is:

$$\$50{,}000 + \$400{,}000 + \$265{,}000 - \$350{,}000 = \$365{,}000$$

For plans that are not at-risk, the deductible limit can be determined under IRC section 404(o)(2)(B), if that gives a larger result than the deductible limit under IRC section 404(o)(2)(A). The deductible limit under IRC section 404(o)(2)(B) is equal to the sum of the funding target and target normal cost, if each were determined as if the plan was at-risk, with the sum being reduced by the actuarial value of assets. These are the target normal cost and funding target using at-risk assumptions.

The IRC section 404(o)(2)(B) deductible limit is:

$$\$60{,}000 + \$600{,}000 - \$350{,}000 = \$310{,}000$$

The deductible limit is the larger of the IRC section 404(o)(2)(A) and 404(o)(2)(B) limits, which is $365,000.

Answer is D.

Note: there are currently no regulations (proposed or otherwise) dealing with deductions under IRC section 404(o). Past application of the deduction limits under IRC section 404 has allowed for an interest adjustment from the valuation date to the earlier of last day of the plan year or the last day of the fiscal year. Without updated regulations, it is not clear whether the $365,000 should be given interest to the end of the year (or even which interest rate to use – presumably the plan effective rate for the year). However, even if $365,000 is given interest at the plan effective rate to the end of the year, the answer still falls within the same answer range.

Question 46

The minimum required contribution for a single employer plan is generally equal to the sum of the target normal cost, the shortfall amortization installments, and any waiver amortization installments (IRC section 430(a)(1)).

The target normal cost for 2010 is given, as are the shortfall amortization installments from 2008 ($0) and 2009 ($28,000).

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2010 is:

$\text{Funding shortfall}_{1/1/2010} = \$2{,}100{,}000 - (\$2{,}125{,}000 - \$100{,}000) = \$75{,}000$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total prefunding balance if the employer elects to use any part of it to reduce the minimum contribution requirement) is at least as large as the funding target. There is a general condition of the exam that states that the employer elects to reduce the minimum required contribution by the prefunding balance unless the question states otherwise (or contains information that would preclude the use of the prefunding balance). This question has no such information, so it must be assumed that the employer will use the prefunding balance, as needed, to reduce the minimum required contribution.

The plan is not exempt from setting up a new shortfall amortization base for 2010 since the funding target ($2,100,000) exceeds the actuarial value of assets reduced by the prefunding balance ($2,025,000). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available for plans that became effective after 2007 (see IRC section 430(c)(5)(B)(iii)), so there is no transition available for this plan.

The 2010 shortfall amortization base is equal to the funding shortfall, reduced by the outstanding balance of any prior year shortfall amortization bases.

There was no shortfall amortization base in 2008. The shortfall amortization base in 2009 was amortized over a period of 7 years using the 2009 segment interest rates to get an installment of $28,000.

The amortization of the base remains the same each year, even though the segment rates may change. However, the outstanding balance of the base is determined each year based upon the current year segment rates. As of 1/1/2010, there are 6 years remaining to amortize the 2009 shortfall base. The outstanding balance as of 1/1/2010 is:

$28,000 × 5.2932 = $148,210

2010 shortfall amortization base = 2010 funding shortfall
– outstanding balance of 2009 shortfall base
= $75,000 - $148,210 = ($73,210)

The new shortfall base for 2010 will result in a negative amortization installment. The 2010 shortfall amortization base is amortized over 7 years using the 2010 segment rates.

($73,210)/5.9982 = ($12,205)

Minimum required contribution$_{1/1/2010}$ = $205,000 + $28,000 - $12,205 = $220,795

Answer is C.

Question 47

An experience gain or loss due to retirement is equal to the difference between the actual liability and the expected liability (equal to the accrued liability under the cost method assuming the participant did not retire). The accrued liability under the unit credit method is equal to the present value of the accrued benefit (using the assumed retirement age – 65 in this question). The early retirement reduction applies to the benefit used for the actual liability for participants who retire prior to age 65.

Smith is age 62 on 1/1/2010. The actual and expected liabilities are:

Actual liability = $\$725 \times (1 - (6\% \times 3 \text{ years})) \times 12 \times \ddot{a}_{62}^{(12)}$
$= \$725 \times 0.82 \times 12 \times 12.40 = \$88,462$
Expected liability = $\$725 \times 12 \times \ddot{a}_{65}^{(12)} \times v^3$
$= \$725 \times 12 \times 11.70 \times 0.839619 = \$85,465$

There is a loss due to the retirement of Smith since the actual liability exceeds the expected liability.

Jones is age 59 on 1/1/2010. The actual and expected liabilities are:

Actual liability = $\$375 \times (1 - (6\% \times 6 \text{ years})) \times 12 \times \ddot{a}_{59}^{(12)}$
$= \$375 \times 0.64 \times 12 \times 13.00 = \$37,440$
Expected liability = $\$375 \times 12 \times \ddot{a}_{65}^{(12)} \times v^6$
$= \$375 \times 12 \times 11.70 \times 0.704961 = \$37,116$

There is a loss due to the retirement of Jones since the actual liability exceeds the expected liability.

Brown is age 55 on 1/1/2010. The actual and expected liabilities are:

Actual liability = $\$150 \times (1 - [(6\% \times 6 \text{ years}) + (5\% \times 4 \text{ years})]) \times 12 \times \ddot{a}_{55}^{(12)}$
$= \$150 \times 0.44 \times 12 \times 13.70 = \$10,850$
Expected liability = $\$150 \times 12 \times \ddot{a}_{65}^{(12)} \times v^{10}$
$= \$150 \times 12 \times 11.70 \times 0.558395 = \$11,760$

There is a gain due to the retirement of Brown since the actual liability is less than the expected liability.

The retirements of Smith and Jones result in an experience loss. Answer is A.

Question 48

The minimum required contribution for a single employer plan is generally equal to the sum of the target normal cost, the shortfall amortization installments, and any waiver amortization installments (IRC section 430(a)(1)).

The target normal cost for 2010 is given, as are the shortfall amortization installments from 2008 (there was none) and 2009 ($15,000).

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance).

The funding shortfall as of 1/1/2010 is:

Funding shortfall$_{1/1/2010}$ = $1,000,000 – ($910,000 – $20,000) = $110,000

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total prefunding balance if the employer elects to use any part of it to reduce the minimum contribution requirement) is at least as large as the funding target. There is a general condition of the exam that states that the employer elects to reduce the minimum required contribution by the prefunding balance unless the question states otherwise (or contains information that would preclude the use of the prefunding balance). This question has no such information, so it must be assumed that the employer will use the prefunding balance, as needed, to reduce the minimum required contribution.

The plan is not exempt from setting up a new shortfall amortization base for 2010 since the funding target ($1,000,000) exceeds the actuarial value of assets reduced by the prefunding balance ($890,000). There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available if IRC section 412(l) – the additional funding charge – applied to the 2007 plan year (see IRC section 430(c)(5)(B)(iv)). That is not the case in this question, since exam general condition 36 states that, unless otherwise indicated, the plan has never been subject to IRC section 412(l). So, applying the transition rule, 96% of the funding target is $960,000 (96% of $1,000,000), which still exceeds the actuarial value of the assets after reduction of the pre-funding balance, so the new funding shortfall amortization base is required. The base is equal to the excess of 96% of the funding target over the actuarial value of the assets (reduced by both credit balance items), less the outstanding balance of the prior shortfall amortization bases.

There was no shortfall amortization base in 2008. The shortfall amortization base in 2009 was amortized over a period of 7 years using the 2009 segment interest rates to get an installment of $15,000.

The amortization of the base remains the same each year, even though the segment rates may change. However, the outstanding balance of the base is determined each year based upon the current year segment rates. As of 1/1/2010, there are 6 years remaining to amortize the 2009 shortfall base. The outstanding balance as of 1/1/2010 is:

$15,000 × 5.3295 = $79,943

2010 shortfall amortization base
= (96% of 2010 funding target – (AVA – Prefunding balance))
– outstanding balance of 2009 shortfall base
= ($960,000 - $890,000) - $79,943 = ($9,943)

The new shortfall base for 2010 will result in a negative amortization installment. The 2010 shortfall amortization base is amortized over 7 years using the 2010 segment rates.

($9,943)/6.0757 = ($1,637)

Minimum required contribution$_{1/1/2010}$ = $75,000 + $15,000 - $1,637 = $88,363

The smallest amount that satisfies the minimum funding standard is equal to the minimum required contribution reduced by the credit balance items, to the extent that they are elected to be used by the employer.

X = $88,363 - $20,000 = $68,363

Answer is D.

Question 49

The lump sum payable to a plan participant is generally equal to the lump sum value calculated using plan equivalence assumptions. However, under IRC section 417(e)(3), the lump sum payable must be at least as large as the lump sum valued using the applicable interest rate (the segment rates) and applicable mortality table. Therefore, the lump sum payable to Smith is equal to the greater of the lump sum valued using plan assumptions and the lump sum valued using IRC section 417(e) assumptions.

The lump sum using plan assumptions is:

$\$25{,}000 \times \ddot{a}_{65}^{(12)} = \$25{,}000 \times 11.31 = \$282{,}750$

The lump sum using IRC section 417(e) assumptions utilizes the segment interest rates. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2010 through 2014), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2015 through 2029), and the segment 3 interest rate is used for the remaining payments (2030 and later). Since Smith's first benefit payment will be at age 65 on 1/1/2010, the segment 1 interest rate of 5% is used to discount benefit payments made from 1/1/2010 through 12/31/2014, the segment 2 interest rate of 6% is used to discount benefit payments made from 1/1/2015 through 12/31/2029, and the segment 3 interest rate of 6.5% is applicable for all benefit payments in 2030 and later. The lump sum using IRC section 417(e)(3) assumptions is:

$$\$25{,}000 \times \left[\frac{N_{65@seg1}^{(12)} - N_{70@seg1}^{(12)}}{D_{65@seg1}} + \frac{N_{70@seg2}^{(12)} - N_{85@seg2}^{(12)}}{D_{65@seg2}} + \frac{N_{85@seg3}^{(12)}}{D_{65@seg3}} \right]$$

$$= \$25{,}000 \times \left[\frac{713{,}162 - 482{,}841}{51{,}213} + \frac{240{,}861 - 149{,}149}{28{,}999} + \frac{103{,}844}{21{,}866} \right]$$

$$= \$310{,}225$$

The lump sum payable to Smith on 1/1/2010 is equal to the greater of these two values. This is $310,225.

Answer is C.

Question 50

Treasury regulation 1.414(l)-1(n)(1)(ii) states that in the event of a spinoff where the plan is at least 100% funded, each participant must receive an allocation of assets from the spun-off plan at least equal to the present value of their accrued benefit, valued on a plan termination basis. The minimum asset value that must be allocated to Smith, Jones and Brown to meet the requirements of IRC section 414(l) is equal to the present value of their accrued benefits valued using the given IRC section 414(l) assumptions.

The early retirement age must be taken into account because the given assumptions under IRC section 414(l) call for the use of the earliest possible retirement age. Note that the early retirement benefit is a fully subsidized accrued benefit. Smith has attained age 55 and has 20 years of service on 1/1/2010, so Smith's accrued benefit is to be valued at age 55. Jones will attain age 55 on 1/1/2015 (at which time Jones will also have 20 years of service), so Jones' accrued benefit is to be valued at age 60. Brown has attained age 55 but has only 10 years of service on 1/1/2010. Brown will not have 20 years of service until attaining age 65, so Brown's accrued benefit is to be valued at age 65.

The individual present values are:

$$\text{Smith: } \$1{,}500 \times 12 \times \frac{N_{55}^{(12)}}{D_{55}} = \$18{,}000 \times \frac{2{,}724{,}628}{229{,}697} = \$213{,}513$$

$$\text{Jones: } \$1{,}125 \times 12 \times \frac{N_{55}^{(12)}}{D_{55}} \times v^5 = \$13{,}500 \times \frac{2{,}724{,}628}{229{,}697} \times 0.712986 = \$114{,}174$$

$$\text{Brown: } \$750 \times 12 \times \frac{N_{65}^{(12)}}{D_{65}} \times v^{10} = \$9{,}000 \times \frac{1{,}089{,}694}{109{,}332} \times 0.508349 = \$45{,}600$$

Total = \$213,513 + \$114,174 + \$45,600 = \$373,287

Answer is E.

Question 51

The probability of retirement at each age must be determined using the given values of $l_x^{(r)}$. Since $l_{61}^{(r)} = 690$ and $l_{62}^{(r)} = 580$, and retirements occur at the end of the year, there must have been 110 retirements just before age 62. It can be thought of as these retirements occurring at exactly age 62. The remaining 580 retirements occur at age 63 (since $l_{63}^{(r)} = 0$). The probability of retirement at age 62 is:

$p_{62}^{(r)} = 110/690 = 15.942\%$

Since the remaining participants retire at age 62, the probability of retirement at age 63 is:

$p_{63}^{(r)} = 100\% - 15.942\% = 84.058\%$

Smith is age 61 as of 1/1/2010. Smith's retirement benefit would be \$60 (\$30 × 2 years of service) if he retired at age 62, and \$90 (\$30 × 3 years of service) if he retired at age 63. Note that the early retirement benefits are fully subsidized.

The present value of Smith's future benefits is equal to the sum of the present value of the benefit payable if Smith retires at age 62 (multiplied by the probability of retirement at age 62), plus the present value of the benefit payable if Smith retires at age 63 (multiplied by the probability of retirement at age 63).

$$\begin{aligned}\text{Present value} &= (\$60 \times 12 \times \ddot{a}_{62}^{(12)} \times v \times 0.15942) + (\$90 \times 12 \times \ddot{a}_{63}^{(12)} \times v^2 \times 0.84058) \\ &= (\$720 \times 10.68 \times 0.934579 \times 0.15942) \\ &\qquad + (\$1{,}080 \times 10.46 \times 0.873439 \times 0.84058) \\ &= \$1{,}146 + \$8{,}294 \\ &= \$9{,}440\end{aligned}$$

Answer is A.

Question 52

The funding target as of 1/1/2010 is equal to the present value of the 1/1/2010 accrued benefit.

Accrued benefit$_{1/1/2010}$ = \$100 × 10 years of service = \$1,000

In determining the present value, the segment interest rates must be used. Smith is 61 as of 1/1/2010. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2010 through 2014), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2015 through 2029), and the segment 3 interest rate is used for the remaining payments (2030 and later). Since Smith's first benefit payment will be at age 65 (the normal retirement age according to the general conditions of the exam) on 1/1/2014, the segment 1 interest rate of 5% is used to discount benefit payments made in 2014, the segment 2 interest rate of 6% is used to discount benefit payments made from 1/1/2015 through 12/31/2029, and the segment 3 interest rate of 7% is applicable for all benefit payments in 2030 and later. The funding target is:

Funding target$_{1/1/2010}$ = \$1,000 × 12

$$\times \left[\frac{N^{(12)}_{65@seg1} - N^{(12)}_{66@seg1}}{D_{65@seg1}} v^4_{seg1} + \frac{N^{(12)}_{66@seg2} - N^{(12)}_{81@seg2}}{D_{65@seg2}} v^4_{seg2} + \frac{N^{(12)}_{81@seg3}}{D_{65@seg3}} v^4_{seg3} \right]$$

$$= \$12{,}000 \times \left[\frac{45{,}046 - 41{,}286}{3{,}862} v^4_{.05} + \frac{20{,}438 - 3{,}099}{2{,}085} v^4_{.06} + \frac{1{,}390}{1{,}132} v^4_{.07} \right]$$

$$= \$99{,}898$$

Answer is B.

Question 53

The minimum required contribution for a single employer plan is generally equal to the sum of the target normal cost, the shortfall amortization installments, and any waiver amortization installments (IRC section 430(a)(1)).

The target normal cost for 2009 is given. There was no shortfall amortization base in 2008 because the 2008 funding target attainment percentage exceeded 100%. In addition, there is no shortfall amortization base in 2009 because the funding target attainment percentage is 100%. Note that under IRC section 430(d)(2), the funding target attainment percentage is equal to the ratio of the actuarial value of the assets (reduced by both the funding standard carryover balance and the prefunding balance) to the funding target.

The minimum required contribution as of 1/1/2009 is equal to the target normal cost of $100,000.

Contributions made after the valuation date are discounted using the plan effective rate for the valuation year from the date contributed to the valuation date. The $50,000 contribution for 2009 was deposited on 9/15/2010, so it must be discounted using the 2009 plan effective rate of 6%.

Discounted 2009 contribution = $50,000 ÷ $1.06^{20.5/12}$ = $45,263

There is a funding deficiency for 2009 equal to the difference between the minimum required contribution and the discounted actual contribution.

2009 funding deficiency = $100,000 - $45,263 = $54,737

IRC section 4971(a) calls for an initial 10% excise tax on funding deficiencies for single employer plans.

Excise tax = 10% × $54,737 = $5,474

Answer is A.

Question 54

The minimum required contribution for a single employer plan is generally equal to the sum of the target normal cost, the shortfall amortization installments, and any waiver amortization installments (IRC section 430(a)(1)).

The target normal cost for 2010 is equal to the present value of the difference between the 12/31/2010 accrued benefit and the 1/1/2010 accrued benefit. There is no target normal cost for Smith in 2010 since Smith terminated employment in 2009. If Smith had not terminated employment, the target normal cost would have been equal to the present value of the accrual for 2010, which would have been \$75 per month of benefit.

In determining the present value, the segment interest rates must be used. Smith is 40 years old as of 1/1/2010. The segment 1 interest rate is used for payments made within the first 5 years of the valuation date (2010 through 2014), the segment 2 interest rate is used for payments made within the next 15 years of the valuation date (2015 through 2029), and the segment 3 interest rate is used for the remaining payments (2030 and later). Since Smith's first benefit payment will be at age 65 (the normal retirement age according to the general conditions of the exam) on 1/1/2035, the segment 3 interest rate of 6% is the only one applicable. The target normal cost (if Smith had not terminated employment) is:

$$\text{Target normal cost}_{1/1/2010} = \$75 \times 12 \times \frac{N^{(12)}_{65(seg3)}}{D_{65(seg3)}} v^{25}_{seg3}$$

$$= \$900 \times \frac{22{,}323}{2{,}073} \times 0.232999$$

$$= \$2{,}258$$

There is a decrease in the target normal cost of \$2,258 due to Smith's termination of employment.

Note that it is assumed that there are no preretirement decrements according to the general conditions of the exam.

Next, the shortfall amortization bases must be considered. The prior shortfall amortization bases will continue to be amortized, regardless of the employment status of Smith. The impact of Smith's termination of employment must be determined with regard to any new shortfall amortization base for 2010.

The funding target is equal to the present value of the 1/1/2010 accrued benefit. Smith has 9.5 years of service as of 1/1/2010 (note that the general conditions of the exam state that the elapsed time method of crediting service is used, which is the reason for Smith being credited with half of a year's service for 2009), so the accrued benefit is $712.50 ($75 × 9.5 years).

$$\text{Funding target}_{1/1/2010} = \$712.50 \times 12 \times \frac{N^{(12)}_{65(seg3)}}{D_{65(seg3)}} v^{25}_{seg3}$$

$$= \$8{,}550 \times \frac{22{,}323}{2{,}073} \times 0.232999$$

$$= \$21{,}452$$

The funding shortfall is equal to the excess, if any, of the funding target over the actuarial value of the assets (reduced by the prefunding balance and the funding standard carryover balance). The actuarial value of the assets is not given in the data. However, it is given that the funding target attainment percentage is equal to 95%. The funding target attainment percentage is equal to the ratio of the actuarial value of the assets (reduced by both the funding standard carryover balance and the prefunding balance) to the funding target (IRC section 430(d)(2)). The prefunding balance and funding standard carryover balance are given to be 0, so the actuarial value of assets is equal to 95% of the funding target.

$AVA_{1/1/2010} = 95\% \times \$21{,}452 = \$20{,}379$

The funding shortfall as of 1/1/2010 is:

$\text{Funding shortfall}_{1/1/2010} = \$21{,}452 - \$20{,}379 = \$1{,}073$

There is an exemption from creating a new shortfall amortization base under IRC section 430(c)(5) in cases where the actuarial value of assets (reduced by the total prefunding balance if the employer elects to use any part of it to reduce the minimum contribution requirement) is at least as large as the funding target.

The plan is not exempt from setting up a new shortfall amortization base for 2010 since the funding target exceeds the actuarial value of assets. There is a transition rule available for 2010 under IRC section 430(c)(5)(B) under which the actuarial value of assets can be compared to only 96% of the funding target for purposes of the exemption. This transition rule is not available for plans that became effective after 2007 (see IRC section 430(c)(5)(B)(iii)), or that were subject to the additional funding requirements of 412(l) for the 2007 plan year. This plan was effective prior to 2008, and according to the general conditions of the exam was not subject to the additional funding requirements of IRC section 412(l). Therefore, the 96% transition is available.

The shortfall amortization base for 2010 is equal to 96% of the funding target, reduced by the actuarial value of the assets, and further reduced by the outstanding balance of any prior shortfall amortization bases. The outstanding balance of prior bases is not known, so it can be referred to as B.

2010 shortfall amortization base = (96% × \$21,452) - \$20,379 – B = \$215 – B

The shortfall amortization base must now be determined if Smith had not terminated employment. In that case, Smith would have had 10 years of service as of 1/1/2010, so the revised calculations would be:

Accrued benefit$_{1/1/2010}$ = \$75 × 10 years of service = \$750

$$\text{Funding target}_{1/1/2010} = \$750 \times 12 \times \frac{N^{(12)}_{65(seg3)}}{D_{65(seg3)}} v^{25}_{seg3}$$

$$= \$9{,}000 \times \frac{22{,}323}{2{,}073} \times 0.232999$$

$$= \$22{,}581$$

2010 shortfall amortization base = (96% × \$22,581) - \$20,379 – B = \$1,299 – B

The increase in the 2010 shortfall amortization base if Smith had not terminated is:

\$1,299 - \$215 = \$1,084

This increase would be amortized over a period of 7 years, using the given factor:

\$1,084/6.1596 = \$176

The decrease in the minimum required contribution for 2010 as of 1/1/2010 is equal to the target normal cost (if Smith had not terminated) and the 7-year amortization of the increase in the amortization of the 2010 shortfall base (if Smith had not terminated).

Decrease = \$2,258 + \$176 = \$2,434

Answer is D.

Question 55

I. IRC section 430(i)(2)(B) provides that a loading factor applies to the target normal cost if the plan was in at-risk status for at least 2 of the preceding 4 plan years. The statement is true.

II. IRC section 430(i)(5) provides for a transition of the target normal cost for the first 5 consecutive years that a plan is in at-risk status. The percentage of 20% is multiplied by consecutive years that the plan has been at-risk, so that each time a plan goes back into being at-risk after being not at-risk in the prior year, a new phase-in begins. The statement is false because it does not specify the use of consecutive years.

III. IRC section 430(i)(3)(A) states that in no event can the at-risk funding target be less than the funding target determined if the plan had not been at-risk. The statement is false.

Answer is B.

Question 56

The gain or loss for 2009 is equal to the difference between the expected unfunded accrued liability on 1/1/2010 and the actual unfunded accrued liability on 1/1/2010. Gains and losses are determined before recognition of any plan amendment or assumption change effective for 2010 (see section 8 of Revenue Ruling 81-213).

The unfunded accrued liability on 1/1/2009 is:

$UAL_{1/1/2009}$ = Accrued liability – Actuarial assets = \$950,000 - \$800,000 = \$150,000

The expected unfunded accrued liability on 1/1/2010 is equal to the 1/1/2009 unfunded accrued liability plus the 1/1/2009 normal cost, rolled forward with valuation interest to 1/1/2010, and reduced by the 2009 contribution also rolled forward with interest from the date contributed to 1/1/2010.

Expected $UAL_{1/1/2010}$ = [(\$150,000 + \$850,000) × 1.08] – (\$950,000 × $1.08^{3/12}$)
= \$111,545

Note that simple interest could have been used instead of compound interest (the final answer will be in the same answer range).

The actual unfunded accrued liability on 1/1/2010 is equal to the accrued liability (before the change in mortality and plan amendment) less the actuarial value of the assets. The plan amendment increased the accrued liability for active participants by 10%, and the mortality change increased the accrued liability for active participants by 7% and for inactive participants by 5%, resulting in an overall increase in liability of 17.7% (110% × 107% = 117.7%) for actives and 5% for inactive participants. The adjusted accrued liability (liability prior to these changes) is:

Adjusted accrued liability = (\$2,050,000/1.177) + (\$250,000/1.05) = \$1,979,811

Actual $UAL_{1/1/2010}$ = \$1,979,811 - \$1,600,000 = \$379,811

The actual UAL is greater than the expected UAL, so there is a loss for 2009.

2009 loss = \$379,811 - \$111,545 = \$268,266

Answer is A.

Question 57

IRC section 430(g)(4)(A) states that contributions deposited after the valuation date that were for the prior year must be discounted to the valuation date using the plan effective rate for the year that the contribution was made, and included in the assets for the current year valuation. A contribution of $300,000 was deposited on 9/1/2010 for the 2009 year, so it must be discounted at the 2009 plan effective rate of 5.00% and included in the 1/1/2010 asset value. Note that the $25,000 contribution made during 2009 is already included in the 1/1/2010 asset value.

1/1/2010 value of plan assets = $1,000,000 + ($300,000/$1.05^{8/12}$) = $1,290,399

Answer is B.

Question 58

Compensation must be limited to the maximum allowed under IRC section 401(a)(17) when determining accrued benefits. In particular, Smith's salary for 2007 must be limited to $225,000, salary for 2008 must be limited to $230,000, and salary for 2009 must be limited to $245,000.

$$\text{4-year average salary} = \frac{\$200{,}000 + \$225{,}000 + \$230{,}000 + \$245{,}000}{4} = \$225{,}000$$

Smith has 8 years of service as of 12/31/2009.

Plan accrued benefit = 7.5% × $225,000 × 8 years of service = $135,000

Smith is age 57 on 12/31/2009. The accrued benefit must be reduced from the normal retirement age of 62 to age 57 using the plan's early retirement reduction, which is actuarial equivalence (6% interest, applicable mortality table). Note that the question does not specify whether preretirement decrements apply; however, the general conditions of the exam state that there are no preretirement decrements unless specified in the question.

$$\begin{aligned}\text{Early retirement benefit} &= \$135{,}000 \times \ddot{a}_{62}^{(12)} \times v_{.06}^{5} \div \ddot{a}_{57}^{(12)} \\ &= \$135{,}000 \times 11.61 \times 0.747258 \div 12.74 \\ &= \$91{,}932\end{aligned}$$

This benefit cannot exceed the limitation under IRC section 415(b). This is equal to the smaller of (1) a benefit of 100% of the high consecutive 3-year average compensation (compensation limit), or (2) $195,000 for 2009 (dollar limit).

The high consecutive 3-year average compensation (with compensation limited to the maximum allowed under IRC section 401(a)(17)) is:

$$\text{3-year average salary} = \frac{\$225{,}000 + \$230{,}000 + \$245{,}000}{3} = \$233{,}333$$

This is reduced pro-rata for years of service less than 10. Smith has only 8 years of service, so the IRC section 415 compensation limit is:

IRC section 415 compensation limit = $233,333 × (8/10) = $186,667

There is no adjustment to the IRC section 415 compensation limit for early retirement, so clearly the plan benefit does not exceed the compensation limit.

The dollar limit of $195,000 is reduced pro-rata for years of plan participation less than 10. The plan was effective on 1/1/2004, so Smith has only 6 years of plan participation through 12/31/2009.

Pro-rated dollar limit = $195,000 × (6/10) = $117,000

The dollar limit is further reduced for retirement prior to age 62. The reduction is based upon the greater of two reductions: (1) an actuarial reduction using plan assumptions, or (2) an actuarial reduction using 5% interest and the applicable mortality table.

Since the plan assumption of 6% interest and the applicable mortality table will clearly reduce the dollar limit by a larger amount (a higher interest rate provides a greater discount), the age-adjusted dollar limit at age 57 is:

$$\begin{aligned}\text{Age-adjusted dollar limit} &= \$117{,}000 \times \ddot{a}_{62}^{(12)} \times v_{.06}^{5} \div \ddot{a}_{57}^{(12)} \\ &= \$117{,}000 \times 11.61 \times 0.747258 \div 12.74 \\ &= \$79{,}674\end{aligned}$$

Note that there is no mortality discount due to the fact that there is a pre-retirement death benefit, so no forfeiture of benefit can occur.

The age-adjusted dollar limit is less than the plan early retirement benefit, so the benefit payable to Smith on 12/31/2009 must be limited to the IRC section 415 limit of $79,674.

Answer is B.

Question 59

A participant currently age 58 with 27 years of service will qualify for early retirement in 2 years, at age 60 with 29 years of service. The initial early retirement benefit is equal to the accrued benefit reduced by 5% per year prior to age 65, likely a very small subsidy. However, once the participant reaches age 61, with 30 years of service, the early retirement benefit will become fully subsidized. It would be most reasonable to assume a spike in retirements at that point in time (age 61). Looking at the various tables under consideration, only Table II shows this large spike, so that table would be most appropriate.

Answer is B.