

AMERICAN SOCIETY OF PENSION PROFESSIONALS AND ACTUARIES  
JOINT BOARD FOR THE ENROLLMENT OF ACTUARIES  
SOCIETY OF ACTUARIES

Enrolled Actuaries Pension Examination, Segment F

# EA-2, Segment F

Date: Tuesday, November 6, 2018

Time: 8:30 a.m. – 12:30 p.m.

## INSTRUCTIONS TO CANDIDATES

1. Write your candidate number here \_\_\_\_\_. Your name must not appear.
2. Do not break the seal of this book until the supervisor tells you to do so.
3. Special conditions generally applicable to all questions on this examination are found at the front of this book.
4. All questions should be answered in accordance with laws, rules and regulations in effect as of May 31, 2018.
5. This examination consists of 56 multiple-choice questions of varying value. The point value for each question is shown in parentheses at the beginning of each question. Total point value is 160.
6. Your score will be based on the point values for the questions that you answer correctly. No credit will be given for omitted answers and no credit will be lost for wrong answers; hence, you should answer all questions even those for which you have to guess. Answer choices C, D, and E will be considered incorrect answers on True-False questions.
7. A separate answer sheet is inside the front cover of this book. During the time allotted for this examination, record all your answers on side 2 of the answer sheet. **NO ADDITIONAL TIME WILL BE ALLOWED FOR THIS PURPOSE.** No credit will be given for anything indicated in the examination book but not transferred to the answer sheet. Failure to stop writing or coding your answer sheet after time is called will result in the disqualification of your answer sheet or further disciplinary action.
8. Up to five answer choices are given with each question, each answer choice being identified by a key letter (A to E). For each question, blacken the oval on the answer sheet which corresponds to the key letter of the answer choice that you select.
9. Use a soft-lead pencil to mark the answer sheet. To facilitate correct mechanical scoring, be sure that, for each question, your pencil mark is dark and completely fills only the intended oval. Make no stray marks on the answer sheet. If you have to erase, do so completely.
10. Do not spend too much time on any one question. If a question seems too difficult, leave it and go on.
11. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.
12. Clearly indicated answer choices in the test book can be an aid in grading examinations in the unlikely event of a lost answer sheet.
13. Use the blank portions of each page for your scratch work. Extra blank pages are provided at the back of the examination book.
14. When the supervisor tells you to do so, break the seal on the book and remove the answer sheet.  
  
On the front of the answer sheet, space is provided to write and code candidate information. Complete the information requested by printing in the squares and blackening the circles (one in each column) corresponding to the letters or numbers printed. For each empty box blacken the small circle immediately above the "A" circle. Fill out the boxes titled:
  - (a) Name  
(include last name, first name and middle initial)
  - (b) Candidate Number  
(Candidate/Eligibility Number, use leading zeros if needed to make it a five digit number)
  - (c) Test Site Code  
(the supervisor will supply the number)
  - (d) Examination Part  
(code the examination that you are taking by blackening the circle to the left of "Course EA-2, Segment F")
  - (e) Booklet Number  
(booklet number can be found in the upper right-hand corner of this examination book. Use leading zeros if needed to make it a four digit number.)
15. After the examination, the supervisor will collect this book and the answer sheet separately. **DO NOT ENCLOSE THE ANSWER SHEET IN THE BOOK.** All books and answer sheets must be returned. **THE QUESTIONS ARE CONFIDENTIAL AND MAY NOT BE TAKEN FROM THE EXAMINATION ROOM.**  
  
In box titled "Complete this section only if instructed to do so", fill in the circle to indicate if you are using a calculator and write in the make and model number.  
  
In the box titled "Signature and Date" sign your name and write today's date. **If the answer sheet is not signed, it will not be graded.**  
  
Leave the boxes titled "Test Code" and "Form Code" blank.  
  
On the back of the answer sheet fill in the Booklet Number in the space provided.

**Answer Key EA-2F Fall 2018**  
**August 21, 2018**

<b>Question</b>	<b>Answer</b>		<b>Question</b>	<b>Answer</b>
1	B		31	A
2	D		32	D
3	D		33	C
4	D		34	B
5	A		35	D
6	C		36	E
7	B		37	B
8	B		38	B
9	A		39	C
10	A		40	B
11	D		41	B
12	B		42	C
13	C		43	B
14	B		44	B
15	B		45	B
16	D		46	B
17	D		47	C
18	E		48	A
19	D		49	B
20	B		50	A
21	A		51	B
22	B		52	C
23	B		53	D
24	B		54	D
25	B		55	B
26	B		56	B
27	D			
28	B			
29	D			
30	C			

Data for Question 1 (1 point)

The plan's valuation date is the last day of the plan year.

A contribution for the plan year is made in the middle of the plan year.

Consider the following statement:

Assets for valuation purposes are reduced by the contribution and interest on the contribution for the period between the date made and the valuation date using the effective interest rate for the prior plan year.

Question 1

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 2 (4 points)

Valuation date: 1/1/2019

Type of plan: Multiemployer

Actuarial cost method: Frozen initial liability

Selected assumptions:

Valuation interest rate	7.00%
Rate of compensation increases	3.00% per year

Credit balance as of 12/31/2018: \$0

Selected valuation results:

	<u>1/1/2018</u>	<u>1/1/2019</u>
Actuarial value of assets	\$75,000	\$80,000
Present value of future benefits	160,000	
Unfunded accrued liability	50,000	
Present value of expected future compensation	600,000	
Present value of expected 2018 compensation	75,000	

All participants are under retirement age and there are no new participants since 1/1/2018.

During 2018, all assumptions are met except the return on assets.

A single contribution of \$7,250 was made on 6/30/2018 for the 2018 plan year.

**\$X** is the normal cost as of 1/1/2019.

Question 2

In what range is **\$X**?

- (A) Less than \$5,000
- (B) \$5,000 but less than \$5,250
- (C) \$5,250 but less than \$5,500
- (D) \$5,500 but less than \$5,750
- (E) \$5,750 or more

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Data for Question 3 (5 points)

Valuation date: 1/1/2019

Selected information:

	<u>1/1/2018</u>	<u>1/1/2019</u>
Prefunding balance	\$32,000	\$35,000
Actuarial (market) value of assets	2,325,000	3,250,000
Funding target	2,850,000	3,200,000
Minimum required contribution	600,000	475,000
Effective interest rate	5.50%	6.50%

The only contribution for the 2018 plan year was \$600,000 made on 1/1/2018.

The entire prefunding balance was applied to the 2019 minimum required contribution on 1/1/2019.

No contributions were made for the 2019 plan year before 6/1/2019.

**\$X** is the smallest amount that satisfies the minimum funding standard for 2019 as of 6/1/2019.

Question 3

In what range is **\$X**?

- (A) Less than \$450,000
- (B) \$450,000 but less than \$451,000
- (C) \$451,000 but less than \$452,000
- (D) \$452,000 but less than \$453,000
- (E) \$453,000 or more

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Data for Question 4 (3 points)

Valuation date: 1/1/2019

Type of plan: Multiemployer

Actuarial cost method: Entry age normal

Selected results for the certification of plan status under IRC section 432 as of 1/1/2019:

Actuarial value of assets	\$2,000,000
Market value of assets	1,800,000
Accrued liability (entry age normal)	3,050,000
Accrued liability (unit credit)	2,900,000

The plan was first certified to be in endangered status as of 1/1/2019.

The plan is projected not to have an accumulated funding deficiency in any of the next 15 years.

**X%** is the funded percentage the plan is required to reach at the close of the funding improvement period.

Question 4

In what range is **X%**?

- (A) Less than 74%
- (B) 74% but less than 76%
- (C) 76% but less than 78%
- (D) 78% but less than 80%
- (E) 80% or more

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Data for Question 5 (4 points)

Valuation date: 1/1/2019

Supplemental benefit: For participants who retire with at least 35 years of service, a supplemental monthly benefit of \$600 is payable until age 62, or death if earlier.

Segment rates: {5.00%, 6.00%, 7.00%}

Retirement assumption: Retirements are assumed to occur at the beginning of the year.

Retirement probabilities:

<u>Age</u>	<u>Probability of retirement</u>
55	60%
60	70%
65	100%

The probability of retirement is 0% at all other ages.

There are no pre-retirement decrements.

The plan population consists of 100 active participants, all with the same data:

Gender	Male
Date of birth	1/1/1989
Date of hire	1/1/2013

Question 5

What is the target normal cost attributable to the supplemental benefit as of 1/1/2019?

- (A) Less than \$1,400
- (B) \$1,400 but less than \$2,100
- (C) \$2,100 but less than \$2,800
- (D) \$2,800 but less than \$3,500
- (E) \$3,500 or more

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Data for Question 6 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

Actuarial cost method: Aggregate

Assumed age of beneficiary: Same as participant

Valuation results as of 1/1/2019 before amendment:

Present value of future benefits - active participants	\$1,350,000
Present value of future benefits - participants and beneficiaries in pay status	300,000
Actuarial value of assets	750,000
Normal cost	75,000

Credit balance at 12/31/2018: \$0

There are no terminated vested participants or deferred beneficiaries.

Selected annuity factors:

$$\begin{array}{ll} \ddot{a}_{65}^{(12)} & 12.00 \\ \ddot{a}_{65:65}^{(12)} & 14.00 \end{array}$$

The plan was amended effective 1/1/2019 to provide an unreduced monthly benefit to future retirees who elect a 100% qualified joint and survivor annuity. 75% of the future retirees are assumed to be married and to elect the 100% qualified joint and survivor annuity. The remaining 25% of the future retirees are assumed to be single and to select the single life annuity.

$\$X$  is the normal cost as of 1/1/2019.

Question 6

In what range is  $\$X$ ?

- (A) Less than \$84,000
- (B) \$84,000 but less than \$88,000
- (C) \$88,000 but less than \$92,000
- (D) \$92,000 but less than \$96,000
- (E) \$96,000 or more

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Data for Question 7 (4 points)

Funding target attainment percentage as of 1/1/2017: 100.00%

Funding shortfall as of 1/1/2018: \$100,000

7-year shortfall amortization factor as of 1/1/2018: 5.9982

Segment rates for 2019: {5.50%, 6.50%, 7.50%}

Selected information as of 1/1/2019:

Prefunding balance	\$75,000
Actuarial (market) value of assets	9,000,000
Funding target	10,000,000
Target normal cost	2,000,000

**\$X** is the **smallest amount that satisfies the minimum funding standard** for 2019 as of 1/1/2019.

Question 7

In what range is **\$X**?

- (A) Less than \$2,097,500
- (B) \$2,097,500 but less than \$2,122,500
- (C) \$2,122,500 but less than \$2,147,500
- (D) \$2,147,500 but less than \$2,172,500
- (E) \$2,172,500 or more

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Data for Question 8 (1 point)

Type of plan: Multiemployer

Actuarial cost method: Aggregate

A plan amendment was adopted that increases the monthly retirement benefits.

Consider the following statement:

The increase in the present value of future benefits due to the plan amendment is amortized in the funding standard account over 15 plan years.

Question 8

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 9 (2 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

The plan is not in critical status or critical and declining status.

The smallest amount that satisfies the minimum funding standard as of 12/31/2019 is \$200,000.

The only contribution for the 2019 plan year was \$180,000 made on 12/31/2019.

Consider the following statement:

The excise tax for failing to meet the minimum funding requirements for the 2019 plan year is \$1,000.

Question 9

Is the above statement true or false?

(A) True

(B) False

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Data for Question 10 (4 points)

Valuation date: 1/1/2019

Normal retirement benefit: \$375 per month per year of service

Early retirement benefit: Accrued benefit with no reduction

Segment rates: {5.00%, 6.00%, 7.00%}

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1980
Date of hire	1/1/2012

Probability of retirement:

<u>Age</u>	<u>Prior</u>	<u>Current</u>
Under 62	0%	0%
62	0%	20%
63	0%	40%
64	0%	0%
65	100%	100%

Retirements are assumed to occur at the beginning of year.

**\$X** is the increase in the 2019 funding target for Smith due to the change in retirement assumptions.

Question 10

In what range is **\$X**?

- (A) Less than \$7,000
- (B) \$7,000 but less than \$8,000
- (C) \$8,000 but less than \$9,000
- (D) \$9,000 but less than \$10,000
- (E) \$10,000 or more

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Data for Question 11 (3 points)

Valuation date: 1/1/2019

Funding standard carryover balance as of 1/1/2018: \$5,000

Prefunding balance as of 1/1/2018: \$25,000

The actual rate of return on assets during 2018 was 12.00%.

Selected information for 2018:

Minimum required contribution	\$150,000
Effective interest rate	4.00%

The plan sponsor elects to apply the entire funding standard carryover balance to offset the 2018 minimum required contribution.

Contributions for the 2018 plan year:

<u>Date</u>	<u>Amount</u>
2/1/2018	\$55,000
3/15/2018	100,000

Question 11

In what range is the prefunding balance at 1/1/2019?

- (A) Less than \$35,500
- (B) \$35,500 but less than \$36,500
- (C) \$36,500 but less than \$37,500
- (D) \$37,500 but less than \$38,500
- (E) \$38,500 or more

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Data for Question 12 (3 points)

Valuation date: 1/1/2019

Prefunding balance as of 1/1/2019: \$4,050,000

Segment rates: {5.00%, 6.00%, 7.00%}

Selected information as of 1/1/2019:

Actuarial (market) value of assets	\$41,000,000
Funding target	36,600,000
Target normal cost	2,400,000
Effective interest rate	6.00%

There was no funding shortfall for any plan year prior to 2019.

The employer makes a single contribution of \$X on 7/1/2019 to satisfy the **minimum required contribution** for the 2019 plan year.

Question 12

In what range is \$X?

- (A) Less than \$2,100,000
- (B) \$2,100,000 but less than \$2,200,000
- (C) \$2,200,000 but less than \$2,300,000
- (D) \$2,300,000 but less than \$2,400,000
- (E) \$2,400,000 or more

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Data for Question 13 (4 points)

Type of plan: Multiemployer

Plan effective date: 1/1/2011

Valuation date: 1/1/2019

Actuarial cost method: Entry age normal

Normal retirement benefit: 2.00% of final compensation per year of service

Valuation interest rate: 7.00%

Assumed rate of compensation increases: 3.00% per year

Selected data for participant Smith:

Gender	Female
Date of birth	1/1/1974
Date of hire	1/1/1999
2018 compensation	\$40,500

$\$X$  is the normal cost for Smith as of 1/1/2019.

Question 13

In what range is  $\$X$ ?

- (A) Less than \$2,000
- (B) \$2,000 but less than \$3,500
- (C) \$3,500 but less than \$5,000
- (D) \$5,000 but less than \$6,500
- (E) \$6,500 or more

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Data for Question 14 (3 points)

Type of plan: Multiemployer

Asset valuation method: Smoothed market value with a 4-year smoothing period (smoothing of difference between expected and actual market value of assets), as described in Rev. Proc. 2000-40

Valuation interest rate: 7.00%

Selected information:

	<u>1/1/2018</u>	<u>1/1/2019</u>
Market value of assets	\$435,000	\$500,000
Total of benefit payments and expenses	35,000	
Sole contribution for plan year	55,000	

Benefit payments, expenses, and contributions are paid on the first day of the plan year.

Market value of assets reflected above are before benefit payments, expenses, and contributions shown above are paid or received.

Asset gains/losses (market value of assets):

	<u>Type</u>	<u>Amount</u>
During 2015	Gain	\$8,700
During 2016	Loss	19,850
During 2017	Gain	22,400

$\$X$  is the actuarial value of assets as of 1/1/2019.

Question 14

In what range is  $\$X$ ?

- (A) Less than \$475,000
- (B) \$475,000 but less than \$500,000
- (C) \$500,000 but less than \$525,000
- (D) \$525,000 but less than \$550,000
- (E) \$550,000 or more

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Data for Question 15 (4 points)

Normal retirement benefit: \$50 per month per year of service

Early retirement eligibility: Age 60 and 10 years of service

Early retirement benefit: Accrued benefit reduced by 3.00% for each year that the benefit commencement date precedes age 65

Segment rates for 2019: {3.00%, 4.00%, 5.00%}

Selected data for participant Smith as of 1/1/2019:

Gender	Male
Age	60
Service	14
Status	Active

$\$X$  is the funding target for participant Smith as of 1/1/2019, if the actuary uses an assumed retirement age of 63.

$\$Y$  is the funding target for participant Smith as of 1/1/2019, if the actuary uses an assumed retirement age of 65.

Question 15

In what range is  $|\$X - \$Y|$ ?

- (A) Less than \$6,000
- (B) \$6,000 but less than \$8,000
- (C) \$8,000 but less than \$10,000
- (D) \$10,000 but less than \$12,000
- (E) \$12,000 or more

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Data for Question 16 (5 points)

Valuation date: 1/1/2019

Effective interest rate: 5.00%

Selected valuation results for the 2019 plan year:

Minimum required contribution	\$1,740,000
Required quarterly installment	250,000
Prefunding balance	0

The plan sponsor makes the first contribution for the 2019 plan year on 6/1/2020 in the amount of \$1,200,000.

The plan sponsor makes an additional contribution of \$X for the 2019 plan year on 9/15/2020 in the **smallest amount that satisfies the minimum funding standard.**

Question 16

In what range is \$X?

- (A) Less than \$600,000
- (B) \$600,000 but less than \$650,000
- (C) \$650,000 but less than \$700,000
- (D) \$700,000 but less than \$750,000
- (E) \$750,000 or more

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Data for Question 17 (3 points)

Type of plan: Multiemployer

Actuarial cost method: Entry age normal

Credit balance as of 12/31/2017: \$0

Actual rate of return on assets during both 2018 and 2019: 3.00% per year

Valuation interest rate: 6.00%

Selected information:

	<u>1/1/2018</u>	<u>1/1/2019</u>
Normal cost	\$250,000	\$235,000
Total amortization charges	120,000	80,000
Total amortization credits	85,000	68,000

Contribution information:

<u>Date</u>	<u>Amount</u>	<u>Plan year</u>
1/1/2018	\$300,000	2018
7/1/2019	325,000	2019

There were no other contributions made for the 2018 or 2019 plan years.

Question 17

In what range is the credit balance as of 12/31/2019?

- (A) Less than \$75,000
- (B) \$75,000 but less than \$80,000
- (C) \$80,000 but less than \$85,000
- (D) \$85,000 but less than \$90,000
- (E) \$90,000 or more

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Data for Question 18 (4 points)

Valuation date: 1/1/2019

Normal retirement benefit: 1.25% of final three-year average compensation per year of service

Segment rates: {5.00%, 6.00%, 7.00%}

Assumed rate of compensation increases: 3.00% per year

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1969
Date of hire	1/1/1999
2016 compensation	\$80,000
2017 compensation	85,000
2018 compensation	90,000

Question 18

In what range is the target normal cost for Smith as of 1/1/2019?

- (A) Less than \$5,000
- (B) \$5,000 but less than \$6,000
- (C) \$6,000 but less than \$7,000
- (D) \$7,000 but less than \$8,000
- (E) \$8,000 or more

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Data for Question 19 (3 points)

Type of plan: Multiemployer

Benefits were frozen under the plan at 1/1/2009.

Valuation date: 1/1/2019

Actuarial cost method: Unit credit

Valuation interest rate: 5.00%

Preretirement death benefits are payable immediately upon death.

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1979
Frozen annual benefit	\$10,800
Pre-retirement death benefit	\$10,000 lump sum
Marital status	Single

Smith died on 12/31/2018.

No pre-retirement decrements were assumed.

$\$X$  is the absolute value of the experience gain for 2018 due to Smith's death.

Question 19

In what range is  $\$X$ ?

- (A) Less than \$11,000
- (B) \$11,000 but less than \$19,000
- (C) \$19,000 but less than \$27,000
- (D) \$27,000 but less than \$35,000
- (E) \$35,000 or more

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Data for Question 20 (5 points)

Asset valuation method: The average of the market value of assets on the valuation date and the adjusted market value of assets for the dates that are 12 and 24 months before the valuation date.

IRC section 430 interest rates for the following plan years:

	<u>2017</u>	<u>2018</u>	<u>2019</u>
1 <sup>st</sup> segment rate	3.00%	4.00%	4.00%
2 <sup>nd</sup> segment rate	4.00%	5.00%	5.00%
3 <sup>rd</sup> segment rate	5.00%	6.00%	6.00%
Effective interest rate	4.50%	5.25%	5.50%

Assumed rate of return on assets for all years: 8.50%

Selected asset information:

	<u>2017</u>	<u>2018</u>	<u>2019</u>
Market value (excluding receivables)	\$400,000	\$500,000	\$600,000
Benefit payments	20,000	25,000	
Expenses paid from plan assets	4,000	4,500	

Benefit payments and expenses are assumed to be paid in the middle of the year for each plan year.

No contributions were made for the 2016 or 2017 plan years.

Contribution information for the 2018 plan year:

<u>Date</u>	<u>Amount</u>
4/1/2018	\$50,000
6/1/2019	30,000

Question 20

In what range is the actuarial value of assets as of 1/1/2019?

- (A) Less than \$564,000
- (B) \$564,000 but less than \$574,000
- (C) \$574,000 but less than \$584,000
- (D) \$584,000 but less than \$594,000
- (E) \$594,000 or more

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Data for Question 21 (1 point)

Type of plan: Multiemployer

Consider the following statement:

The actuary must use the unit credit cost method to determine the plan's funded percentage for the purpose of determining whether a plan is in critical status or endangered status.

Question 21

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 22 (1 point)

For the 2018 plan year, an enrolled actuary completes all actuarial services for a plan. There is a signed standing election to use the prefunding balance to satisfy the minimum required contribution.

For the 2019 plan year, a different enrolled actuary is assigned within the same actuarial firm.

Consider the following statement:

The standing election remains in effect for the 2019 plan year.

Question 22

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 23 (3 points)

Valuation date: 1/1/2019

Minimum required contribution as of 1/1/2018 for 2018 plan year: \$15,000,000

Actual rate of return on assets during 2018: 12.00%

Selected information:

	<u>2018</u>	<u>2019</u>
Effective interest rate	6.00%	5.00%

The sole contribution for the 2018 plan year, paid on 7/1/2018: \$16,000,000

**\$X** is the available amount to add to the prefunding balance as of 1/1/2019.

Question 23

In what range is **\$X**?

- (A) Less than \$500,000
- (B) \$500,000 but less than \$600,000
- (C) \$600,000 but less than \$700,000
- (D) \$700,000 but less than \$800,000
- (E) \$800,000 or more

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Data for Question 24 (1 point)

Type of plan: Multiemployer

Actuarial cost method: Entry age normal

Consider the following statement:

For purposes of IRC section 412, the cost of ancillary benefits provided by the plan may be computed using the unit credit cost method.

Question 24

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 25 (1 point)

Selected data for participant Smith as of 1/1/2018:

Date of birth	1/1/1963
Status	Active
Formula annual accrued benefit, before reflecting IRC section 415 limit	\$270,000

The actuary's best estimate of the IRC section 415 maximum dollar limitation in 2028 is \$250,000.

Consider the following statement:

The 1/1/2018 funding target for Smith is the present value of an annual accrued benefit of \$250,000 payable as an annuity.

Question 25

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 26 (2 points)

Valuation date: 1/1/2019

Plan is in at-risk status for 2014, 2016, and 2019.

Selected information:

Present value of all benefits expected to accrue or be earned during the year, without regard to at-risk assumptions	\$200,000
Present value of all benefits expected to accrue or be earned during the year, using at-risk assumptions	250,000
Administrative expenses expected to be paid from the plan assets at beginning of year	8,000

$\$X$  is the target normal cost for the 2019 plan year.

Question 26

In what range is  $\$X$ ?

- (A) Less than \$215,000
- (B) \$215,000 but less than \$225,000
- (C) \$225,000 but less than \$235,000
- (D) \$235,000 but less than \$245,000
- (E) \$245,000 or more

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Data for Question 27 (4 points)

Type of plan: Multiemployer

Plan effective date: 1/1/1985

Valuation date: 1/1/2019

Actuarial cost method: Aggregate

Early retirement benefit: Unreduced accrued benefit payable at age 50 with 20 years of service

Normal retirement benefit: 50% of final three-year average compensation

Credit balance as of 12/31/2018: \$0

Valuation interest rate: 7.00%

Assumed rate of compensation increases: 3.50% per year

Assumed retirement age: 52

Actuarial value of assets as of 1/1/2019: \$450,000

Selected data for all 10 participants as of 1/1/2019:

Gender	Female
Age	45
Date of hire	1/1/1998
2018 compensation	\$50,000

$\ddot{a}_{52}^{(12)}$  at 7% interest = 11.80

$\$X$  is the normal cost as of 1/1/2019.

Question 27

In what range is  $\$X$ ?

- (A) Less than \$210,000
- (B) \$210,000 but less than \$240,000
- (C) \$240,000 but less than \$270,000
- (D) \$270,000 but less than \$300,000
- (E) \$300,000 or more

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Data for Question 28 (1 point)

Consider the following statement:

When calculating a funding target for benefits subject to the annuity substitution rule, segment rates are not stabilized.

Question 28

Is the above statement true or false?

(A) True

(B) False

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Data for Question 29 (3 points)

Selected information as of 1/1/2018:

Prefunding balance	\$1,500,000
Target normal cost	1,000,000
Shortfall amortization charge	300,000
Effective interest rate	6.50%

On 7/1/2018, the plan sponsor makes a contribution of \$1,675,000 for the 2018 plan year. This is the only contribution made for the plan year.

Actual rate of return on assets during 2018: 12.00%

$\$X$  is the prefunding balance as of 1/1/2019.

Question 29

In what range is  $\$X$ ?

- (A) Less than \$1,990,000
- (B) \$1,990,000 but less than \$2,003,000
- (C) \$2,003,000 but less than \$2,016,000
- (D) \$2,016,000 but less than \$2,029,000
- (E) \$2,029,000 or more

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Data for Question 30 (4 points)

Plan type: Statutory hybrid (cash balance)

Optional form of payment: Immediate lump sum payment equal to the participant's hypothetical account balance upon termination of employment.

Selected assumptions as of 1/1/2019:

Segment rates	{5.00%, 6.00%, 7.00%}
Interest crediting rate	5.00% per year

Form of payment assumption:

Single life annuity	15%
Lump sum	85%

Fixed plan factor to convert account balance to single life annuity at normal retirement age: 10.50

Data for participant Smith as of 1/1/2019:

Gender	Female
Age	50
Hypothetical account balance	\$250,000

Question 30

In what range is the funding target for Smith as of 1/1/2019?

- (A) Less than \$205,000
- (B) \$205,000 but less than \$210,000
- (C) \$210,000 but less than \$215,000
- (D) \$215,000 but less than \$220,000
- (E) \$220,000 or more

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Data for Question 31 (1 point)

Waivers of minimum funding requirements were obtained for each of the 2017 and 2018 plan years.

There were no waivers of minimum funding requirements granted before the 2017 plan year.

The plan sponsor applies for a waiver of minimum funding requirements for the 2019 plan year on 1/31/2020.

Consider the following statement:

The plan sponsor is permitted by law to obtain a waiver from a portion of the minimum funding requirements for the 2019 plan year.

Question 31

Is the above statement true or false?

(A) True

(B) False

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Data for Question 32 (4 points)

Type of plan: Multiemployer

Actuarial cost method: Entry age normal

Credit balance as of 12/31/2017: \$250,000

Valuation interest rate: 7.00%

Selected information:

	<u>1/1/2017</u>	<u>1/1/2018</u>
Actuarial (market) value of assets	\$600,000	\$590,000
Accrued liability	750,000	770,000
Normal cost	70,000	72,000
Amortization charges for all bases established before 1/1/2018	60,000	55,000
Amortization credits for all bases established before 1/1/2018	(18,000)	(15,000)

A single contribution of \$75,000 was made on 12/31/2017 for the 2017 plan year.

A single contribution of \$70,000 was made on 12/31/2018 for the 2018 plan year.

**\$X** is the credit balance as of 12/31/2018.

Question 32

In what range is **\$X**?

- (A) Less than \$215,000
- (B) \$215,000 but less than \$215,250
- (C) \$215,250 but less than \$215,500
- (D) \$215,500 but less than \$215,750
- (E) \$215,750 or more

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Data for Question 33 (4 points)

Valuation date: 1/1/2019

1/1/2019 prefunding balance: \$0

Selected valuation results:

	<u>1/1/2018</u>	<u>1/1/2019</u>
Target normal cost	\$100,000	\$135,000
Shortfall amortization charge	500,000	505,000
Effective interest rate		6.00%

The plan sponsor makes a contribution for the 2019 plan year of \$350,000 on 4/15/2019.

No other contributions for the 2019 plan year are made before 9/15/2020.

**\$X** is the smallest amount that must be contributed on 9/15/2020 to satisfy the remaining minimum required contribution for the 2019 plan year.

Question 33

In what range is **\$X**?

- (A) Less than \$326,500
- (B) \$326,500 but less than \$330,500
- (C) \$330,500 but less than \$334,500
- (D) \$334,500 but less than \$338,500
- (E) \$338,500 or more

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Data for Question 34 (1 point)

Valuation date: 1/1/2019

Normal retirement benefit: \$100 per month per year of service

On 2/1/2020, the plan sponsor adopts an amendment to change the benefit formula for service earned after 2018 to \$110 per month per year of service.

Consider the following statement:

The amendment must be taken into account in determining the plan's funding target and target normal cost for the 2019 plan year.

Question 34

Is the above statement true or false?

(A) True

(B) False

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Data for Question 35 (3 points)

Valuation date: 1/1/2019

There were no unpaid minimum required contributions for any plan year before 2019.

The plan sponsor did not make an election to use funding balances to offset the minimum required contribution for 2019.

Segment rates: {5.00%, 6.00%, 7.00%}

Effective interest rate: 5.90%

The minimum required contribution for the 2019 plan year is \$250,000.

The only contribution for the 2019 plan year was \$200,000 made on 7/1/2019.

**\$X** is the initial IRC section 4971 excise tax due on the unpaid minimum required contribution for the 2019 plan year.

Question 35

In what range is **\$X**?

- (A) Less than \$5,000
- (B) \$5,000 but less than \$5,200
- (C) \$5,200 but less than \$5,400
- (D) \$5,400 but less than \$5,600
- (E) \$5,600 or more

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Data for Question 36 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

Normal retirement benefit: 2.00% of the highest consecutive three-year average compensation per year of service

Actuarial cost method: Projected unit credit

Interest rate: 7.00%

Assumed rate of compensation increases: 1.50% per year

Selected annuity factor at 7% interest:

$$\ddot{a}_{65}^{(12)} \quad 10.11$$

Data for participant Smith:

Date of birth      1/1/1974

Date of hire      1/1/2014

Compensation	<u>2016</u>	<u>2017</u>	<u>2018</u>
	\$98,000	\$99,000	\$100,000

$\$X$  is the accrued liability for Smith as of 1/1/2019.

Question 36

In what range is  $\$X$ ?

- (A) Less than \$28,500
- (B) \$28,500 but less than \$30,500
- (C) \$30,500 but less than \$32,500
- (D) \$32,500 but less than \$34,500
- (E) \$34,500 or more

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Data for Question 37 (3 points)

Selected segment rates for the 2019 plan year:

IRC section 430 24-month average segment rates prior to stabilization: {2.50%, 3.75%, 5.00%}

25-year average segment rates: {4.50%, 5.50%, 6.50%}

There are no shortfall amortization installments established before 2019.

There are no funding balances as of 1/1/2019.

Selected information as of 1/1/2019:

Actuarial (market) value of assets	\$2,000,000
Funding target	2,326,000
Target normal cost	80,000

Question 37

In what range is the **minimum required contribution** for 2019?

- (A) Less than \$132,500
- (B) \$132,500 but less than \$133,000
- (C) \$133,000 but less than \$133,500
- (D) \$133,500 but less than \$134,000
- (E) \$134,000 or more

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Data for Question 38 (2 points)

Type of plan: Multiemployer

Plan effective date: 1/1/2019

Valuation date: 1/1/2019

Actuarial cost method: Unit credit

Interest rate: 6.00%

Selected valuation results as of 1/1/2019:

Actuarial (market) value of assets	\$0
Unit credit initial liability	150,000
Normal cost	50,000

A single contribution of \$125,000 for the 2019 plan year is made on 12/31/2019.

**\$X** is the expected unfunded actuarial liability as of 1/1/2020.

Question 38

In what range is **\$X**?

- (A) Less than \$50,000
- (B) \$50,000 but less than \$100,000
- (C) \$100,000 but less than \$150,000
- (D) \$150,000 but less than \$200,000
- (E) \$200,000 or more

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Data for Question 39 (4 points)

Normal retirement benefit: \$75 per month per year of service

Selected information as of 1/1/2018 for participant Smith:

Funding target	\$56,000
Target normal cost	2,500

IRC section 430 segment rates for 2018: {4.00%, 5.00%, 6.00%}

Data for participant Smith:

Date of birth	1/1/1974
Date of hire	1/1/1998
Date of termination	12/31/2018

IRC section 417(e) applicable interest rates: {3.00%, 4.00%, 5.00%}

Select IRC section 417(e) commutation functions:

Age	Segment 2		Segment 3	
	$D_x$	$N_x^{(12)}$	$D_x$	$N_x^{(12)}$
45	169,030		109,888	
50		2,519,727		
65		972,107		477,312

On 12/31/2018, Smith receives a lump sum distribution equal to the IRC section 417(e) present value of his accrued benefit.

$\$X$  is the experience gain or loss for 2018 due to Smith's termination and lump sum election.

Question 39

In what range is  $\$X$ ?

- (A) Loss of at least \$60,000
- (B) Loss of at least \$30,000 but less than \$60,000
- (C) Loss of more than \$0 but less than \$30,000
- (D) Gain of at least \$0 but less than \$30,000
- (E) Gain of at least \$30,000

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Data for Question 40 (4 points)

Normal retirement benefit: 1.40% of final compensation per year of service

Normal form of payment: 5-year certain and life annuity

Segment rates for 2019: {5.00%, 6.00%, 7.00%}

Selected data for participant Smith as of 1/1/2019:

Gender	Male
Age	60
Service	15
Status	Active
2018 compensation	\$90,000

Smith is assumed to elect a 5-year certain and life annuity.

**\$X** is the funding target for Smith as of 1/1/2019.

Question 40

In what range is **\$X**?

- (A) Less than \$151,000
- (B) \$151,000 but less than \$152,500
- (C) \$152,500 but less than \$154,000
- (D) \$154,000 but less than \$155,500
- (E) \$155,500 or more

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Data for Question 41 (1 point)

Consider the following statement:

The unused prefunding balance is adjusted annually to reflect the rate of return on the actuarial value of assets for the preceding year.

Question 41

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 42 (4 points)

Selected information as of 1/1/2018:

Actuarial (market) value of assets	\$650,000
Effective interest rate	5.50%

Contribution information for the 2018 plan year:

<u>Date</u>	<u>Amount</u>
9/1/2018	\$40,000
6/1/2019	100,000

No benefit payments or expenses were paid from the plan during 2018.

Segment rates for 2019: {5.00%, 6.00%, 7.00%}

Selected information as of 1/1/2019:

Funding target	\$750,000
Target normal cost	77,000
Effective interest rate	7.00%

There are no funding balances as of 1/1/2019.

$\$X$  is the 2019 **minimum required contribution** if the actual return on assets during 2018 was negative 3.00%.

$\$Y$  is the 2019 **minimum required contribution** if the actual return on assets during 2018 was positive 6.00%.

Question 42

In what range is  $|\$X - \$Y|$ ?

- (A) Less than \$56,500
- (B) \$56,500 but less than \$58,000
- (C) \$58,000 but less than \$59,500
- (D) \$59,500 but less than \$61,000
- (E) \$61,000 or more

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Data for Question 43 (2 points)

Valuation date: 1/1/2019

The plan has 5,000 active participants.

Over the past 5 years, the average retirement age has been 63.

The plan provides actuarially reduced early retirement benefits at age 60 with 10 years of service and an unreduced benefit at age 62 if the participant has 25 years of service.

The employer's generous post-retirement medical benefits are available to all pension plan participants who retire on or after age 60. The employer's experience is that the availability of post-retirement medical benefits is a major factor in employees' retirement decisions.

Effective 1/1/2019, post-retirement medical benefits will start at age 65 for future retirees.

The actuary knows of no other reason to expect retirement patterns to change significantly in the future.

Consider the following sets of proposed retirement rates:

<u>Age</u>	<u>Current</u>	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>	<u>V</u>
60	15%	15%	5%	5%	0%	0%
61	10%	10%	5%	5%	0%	0%
62	50%	50%	25%	10%	100%	0%
63	30%	30%	10%	30%	100%	100%
64	40%	40%	10%	40%	100%	100%
65	100%	100%	100%	100%	100%	100%

Question 43

Which of the above sets of retirement rates would be the most reasonable assumption for the 1/1/2019 valuation?

- (A) I
- (B) II
- (C) III
- (D) IV
- (E) V

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Data for Question 44 (2 points)

Valuation date: 1/1/2019

Selected information as of 1/1/2018:

Prefunding balance	\$3,000
Market value of assets	1,450,000
Actuarial value of assets	1,500,000
Funding target without regard to at-risk assumptions	1,900,000
At-risk funding target	2,100,000

Total plan participants as of 12/31/2018: 990

Consider the following statement:

The plan is in at-risk status for the 2019 plan year.

Question 44

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 45 (3 points)

Valuation date: 1/1/2019

Normal retirement benefit: 1.75% of final three-year average compensation per year of service

Segment rates: {3.00%, 4.00%, 5.00%}

Assumed rate of compensation increases: 5.00% per year

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1974
Date of hire	1/1/2000
2016 compensation	\$50,000
2017 compensation	52,000
2018 compensation	58,000

$\$X$  is the increase in funding target as of 1/1/2019 due to Smith's actual 2018 compensation being greater than expected.

Question 45

In what range is  $\$X$ ?

- (A) Less than \$1,000
- (B) \$1,000 but less than \$4,000
- (C) \$4,000 but less than \$7,000
- (D) \$7,000 but less than \$10,000
- (E) \$10,000 or more

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Data for Question 46 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

Actuarial cost method: Projected unit credit

Credit balance as of 12/31/2018: \$2,500

Actuarial loss during 2018: \$13,000

Valuation interest rate: 6.50%

Selected valuation results as of 1/1/2019:

Normal cost: \$20,000

All funding standard account bases established prior to 2019:

	Years <u>remaining</u>	Outstanding <u>balance</u>
Combined charge base	10	\$45,000
Actuarial gain	14	(8,000)

The plan adopts an amendment on 12/31/2018 that provides one-time payments to retirees on both 12/31/2019 and 12/31/2020.

This amendment increases the plan's 1/1/2019 liability by \$15,000.

**\$X** is the smallest amount that satisfies the minimum funding standard as of 12/31/2019.

Question 46

In what range is **\$X**?

- (A) Less than \$33,000
- (B) \$33,000 but less than \$35,000
- (C) \$35,000 but less than \$37,000
- (D) \$37,000 but less than \$39,000
- (E) \$39,000 or more

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Data for Question 47 (3 points)

Valuation date: 1/1/2019

Actual rate of return on assets for 2018: 3.00%

Selected information as of 1/1/2018:

Prefunding balance	\$180,000
Segment rates	{5.00%, 6.00%, 7.00%}
Minimum required contribution	\$500,000
Effective interest rate	6.00%

Funding balance elected to offset the 2018 plan year funding requirement: \$10,000

Sole contribution for the 2018 plan year made on 7/1/2019: \$700,000

Question 47

In what range is the prefunding balance as of 1/1/2019?

- (A) Less than \$328,000
- (B) \$328,000 but less than \$332,000
- (C) \$332,000 but less than \$336,000
- (D) \$336,000 but less than \$340,000
- (E) \$340,000 or more

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Data for Question 48 (1 point)

A plan has an unpaid minimum required contribution of \$110,000 for the 2019 plan year.

Consider the following statement:

For 2019, the initial excise tax due under IRC section 4971 is \$11,000.

Question 48

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 49 (2 points)

Valuation date: 1/1/2019

Selected information:

	<u>1/1/2018</u>	<u>1/1/2019</u>
Prefunding balance	\$400,000	\$430,000
Actuarial (market) value of assets	8,000,000	9,400,000
Funding target	9,600,000	10,000,000
Minimum required contribution	94,000	90,000

Consider the following statement:

The plan sponsor may elect to apply a portion of the prefunding balance on 4/1/2019 to meet all quarterly requirements for the 2019 plan year.

Question 49

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 50 (1 point)

Valuation date: 1/1/2019

Prefunding balance as of 1/1/2019: \$300,000

Minimum required contribution as of 1/1/2019: \$250,000

The plan sponsor is eligible to apply the prefunding balance to offset the current plan year's minimum required contribution.

Consider the following statement:

The plan sponsor has until 9/15/2020 to elect to apply the prefunding balance to reduce the minimum required contribution for the 2019 plan year.

Question 50

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 51 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

Actuarial cost method: Unit credit

Normal retirement benefit: \$125 per month per year of service

Early retirement benefit: Accrued benefit reduced by 3.00% for each year that the benefit commencement date precedes age 65

Plan conversion factor for 10-year certain and life annuity: .90

Valuation interest rate: 7.00%

Pre-retirement decrements other than death: None

Selected data for participant Smith:

Gender	Female
Date of birth	1/1/1957
Date of hire	1/1/2005
Date of retirement	12/31/2018
Elected form of annuity	10-year certain and life

$\$X$  is the absolute value of the experience gain/loss for 2018 due to Smith's retirement and benefit election.

Question 51

In what range is  $\$X$ ?

- (A) Less than \$16,000
- (B) \$16,000 but less than \$20,000
- (C) \$20,000 but less than \$24,000
- (D) \$24,000 but less than \$28,000
- (E) \$28,000 or more

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Data for Question 52 (4 points)

Type of plan: Multiemployer

Actuarial cost method: Entry age normal

Valuation interest rate: 6.50%

RPA'94 current liability interest rate: 4.00%

Credit balance as of 12/31/2018: \$100,000

Selected information as of 1/1/2019:

Market value of assets	\$4,000,000
Actuarial value of assets	4,200,000
Actuarial accrued liability	5,000,000
Normal cost	600,000
Expected benefit payments, paid on 7/1/2019	75,000
Minimum required contribution	1,400,000
Amortization of outstanding bases over 10 years	80,000
RPA'94 current liability	3,750,000
Expected increase in RPA'94 current liability for the plan year due to benefits accruing	550,000
Expected release from RPA'94 current liability for the plan year, valued at 7/1/2019	80,000

$\$X$  is the deductible limit for 2019 as of 12/31/2019.

Question 52

In what range is  $\$X$ ?

- (A) Less than \$1,600,000
- (B) \$1,600,000 but less than \$1,700,000
- (C) \$1,700,000 but less than \$1,800,000
- (D) \$1,800,000 but less than \$1,900,000
- (E) \$1,900,000 or more

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Data for Question 53 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

Actuarial value of assets: Smoothed market value with a 4-year smoothing period (smoothing of difference between expected and actual market value of assets), as described in Rev. Proc. 2000-40

Market value of assets as of 1/1/2019: \$1,350,000

Asset gains/losses (market value of assets):

	<u>Type</u>	<u>Amount</u>
During 2015	Loss	\$80,000
During 2016	Loss	310,000
During 2017	Gain	400,000
During 2018	Loss	600,000

$\$X$  is the actuarial value of assets as of 1/1/2019.

Question 53

In what range is  $\$X$ ?

- (A) Less than \$1,500,000
- (B) \$1,500,000 but less than \$1,550,000
- (C) \$1,550,000 but less than \$1,600,000
- (D) \$1,600,000 but less than \$1,650,000
- (E) \$1,650,000 or more

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Data for Question 54 (3 points)

Valuation date: 1/1/2019

The plan received a waiver of \$245,000 for the 2018 plan year minimum required contribution.

Segment rates in effect for the 2018 and 2019 plan years: {5.00%, 6.00%, 7.00%}

Selected valuation results as of 1/1/2019:

Target normal cost	\$150,000
Shortfall amortization charge	85,000

**\$X** is the minimum required contribution for 2019 as of 1/1/2019.

Question 54

In what range is **\$X**?

- (A) Less than \$280,000
- (B) \$280,000 but less than \$285,000
- (C) \$285,000 but less than \$290,000
- (D) \$290,000 but less than \$295,000
- (E) \$295,000 or more

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Data for Question 55 (1 point)

Valuation date: 1/1/2019

Assumed form of payment: 100% of participants elect a lump sum

Lump sum payments are based on the IRC section 417(e) applicable mortality table and applicable interest rates.

Consider the following statement:

The funding target as of 1/1/2019 is determined using the IRC section 417(e) applicable interest rates.

Question 55

Is the above statement true or false?

(A) True

(B) False

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Data for Question 56 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2019

Actuarial cost method:

Prior to 2019 plan year:	Entry age normal
After 2018 plan year:	Unit credit

Normal retirement benefit: \$200 per month per year of service

Valuation interest rate: 6.00%

Selected annuity factor at 6% interest:

$$\ddot{a}_{65}^{(12)} \quad 10.99$$

Data for participant Smith:

Gender	Male
Date of birth	1/1/1965
Date of hire	1/1/2000

$\$X$  is the change in accrued liability for Smith as of 1/1/2019 due to the change in actuarial cost method.

Question 56

In what range is the absolute value of  $\$X$ ?

- (A) Less than \$60,000
- (B) \$60,000 but less than \$75,000
- (C) \$75,000 but less than \$90,000
- (D) \$90,000 but less than \$105,000
- (E) \$105,000 or more

**\*\*END OF EXAMINATION\*\***

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