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EA-1 Exam

110 Original Questions and Solutions



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EA-1 Review Questions

Question 1

An initial deposit is made to a fund on 1/1/1998 of \$1,000, with subsequent deposits at the end of every calendar quarter of \$1,000. For the first five years, interest is earned at an annual effective rate of 10%. For the remaining eight years, interest is earned at an annual rate of discount convertible semiannually of 12%.

In what range is the accumulated value of the fund as of 12/31/2010?

- (A) Less than \$120,000
- (B) \$120,000 but less than \$123,000
- (C) \$123,000 but less than \$126,000
- (D) \$126,000 but less than \$129,000
- (E) \$129,000 or more

Question 2

Value of a pension fund on 1/1/2000: \$30,000

Contribution to the pension fund on 6/30/2000: \$10,000

Value of the pension fund on 12/31/2000: \$50,000

In what range is the rate of return for 2000?

- (A) Less than 26%
- (B) 26% but less than 27%
- (C) 27% but less than 28%
- (D) 28% but less than 29%
- (E) 29% or more

Question 3

Beginning January 1, 2000, 15 annual deposits of \$1,500 are made to a savings account. Beginning January 1, 2015, annual withdrawals of \$4,500 are made until the savings account is completely exhausted immediately after the withdrawal made on January 1, 2029.

In what range is the effective annual interest rate earned by the account?

- (A) Less than 6.5%
- (B) 6.5% but less than 7.0%
- (C) 7.0% but less than 7.5%
- (D) 7.5% but less than 8.0%
- (E) 8.0% or more

Question 4

Deposits to a fund: \$1,000
Number of deposits: 40
Date of first deposit: January 1, 2000
Frequency of deposit: Quarterly
Rate of interest: 8% per year, compounded quarterly

Twenty withdrawals of \$3,000 each are made annually, beginning on January 1, 2010.

In what range is the fund balance on January 1, 2030?

- (A) Less than \$110,000
- (B) \$110,000 but less than \$120,000
- (C) \$120,000 but less than \$130,000
- (D) \$130,000 but less than \$140,000
- (E) \$140,000 or more

Question 5

A pension fund earns a gross effective annual interest rate of $j\%$.

At the end of each quarter, a charge equal to $.25\%$ of the fund balance is withdrawn. After this deduction, the fund earns a net effective annual interest rate of 10% . There are no deposits to the fund and no withdrawals other than this charge.

In what range is $j\%$?

- (A) Less than 10.8%
- (B) 10.8% but less than 10.9%
- (C) 10.9% but less than 11.0%
- (D) 11.0% but less than 11.1%
- (E) 11.1% or more

Question 6

Selected values:

$$\ddot{a}_{\overline{n}|} = 7.2077 \quad \ddot{a}_{\overline{n+1}|} = 7.3069$$

In what range is the effective annual rate of interest?

- (A) Less than 13.5%
- (B) 13.5% but less than 14.0%
- (C) 14.0% but less than 14.5%
- (D) 14.5% but less than 15.0%
- (E) 15.0% or more

Question 7

$$\ddot{a}_{\overline{n}|} = 6.76 \quad (1 + i)^n = 2.59$$

In what range is $100s_{\overline{2n}|}$?

- (A) Less than 5,700
- (B) 5,700 but less than 5,725
- (C) 5,725 but less than 5,750
- (D) 5,750 but less than 5,775
- (E) 5,775 or more

Question 8

Smith enrolls in a four year college on October 1, 2000. Quarterly tuition payments of \$3,000 per quarter are due on the first of day of each quarter (October 1, January 1, and April 1). No payment is due on July 1.

The effective annual interest rate is 8%.

In what range is the present value as of October 1, 2000 of the tuition payments for the four years?

- (A) Less than \$30,000
- (B) \$30,000 but less than \$31,000
- (C) \$31,000 but less than \$32,000
- (D) \$32,000 but less than \$33,000
- (E) \$33,000 or more

Question 9

A loan is to be repaid by 16 quarterly payments of \$50, \$100, \$150, ..., \$800, the first payment due three months after the loan is made.

The force of interest is 8%.

In what range is the total amount of interest paid over the life of the loan?

- (A) Less than \$1,220
- (B) \$1,220 but less than \$1,320
- (C) \$1,320 but less than \$1,420
- (D) \$1,420 but less than \$1,520
- (E) \$1,520 or more

Question 10

Selected values:

$$s_{\overline{n}|} = 20 \quad s_{\overline{2n}|} = 59$$

In what range is $s_{\overline{4n}|}$?

- (A) Less than 180
- (B) 180 but less than 210
- (C) 210 but less than 240
- (D) 240 but less than 270
- (E) 270 or more

Question 11

The present value of a continuous annuity of 1 per year for n years is 4.

The force of interest is equal to 12.5%.

In what range is the accumulated value of a continuous annuity of 1 per year for $2n$ years?

- (A) Less than 10
- (B) 10 but less than 15
- (C) 15 but less than 20
- (D) 20 but less than 25
- (E) 25 or more

Question 12

A perpetuity of \$1,000 is paid each January 1, beginning on 1/1/2000, with increases of 4% each subsequent January 1. The annual effective rate of interest is 6%.

In what range is the present value of the annuity as of 1/1/2000?

- (A) Less than \$52,800
- (B) \$52,800 but less than \$53,800
- (C) \$53,800 but less than \$54,800
- (D) \$54,800 but less than \$55,800
- (E) \$55,800 or more

Question 13

A perpetuity of \$1,000 is paid each January 1, beginning on 1/1/2000, with increases of \$100 each subsequent January 1. The annual effective rate of interest is 6%.

In what range is the present value of the annuity as of 1/1/2000?

- (A) Less than \$47,800
- (B) \$47,800 but less than \$48,800
- (C) \$48,800 but less than \$49,800
- (D) \$49,800 but less than \$50,800
- (E) \$50,800 or more

Question 14

An annuity of \$1,000 is paid each January 1, beginning on 1/1/2000, with increases of 5% each subsequent January 1. There are a total of 30 payments. The annual effective rate of interest is 7%.

In what range is the present value of the annuity as of 1/1/2000?

- (A) Less than \$22,000
- (B) \$22,000 but less than \$23,000
- (C) \$23,000 but less than \$24,000
- (D) \$24,000 but less than \$25,000
- (E) \$25,000 or more

Question 15

Terms of an annuity certain:

Date of first payment: 3/31/2000

Date of last payment: 12/31/2029

Frequency of payments: Quarterly

Amount of initial payment: \$500

Payment increases: \$100 every two years, beginning 3/31/3002

Interest rate: 6% per year, compounded monthly

In what range is the present value of the annuity as of 1/1/2000?

- (A) Less than \$52,000
- (B) \$52,000 but less than \$53,000
- (C) \$53,000 but less than \$54,000
- (D) \$54,000 but less than \$55,000
- (E) \$55,000 or more

Question 16

Amount of loan: \$10,000

Date of loan: January 1, 1998

Number of payments: 60

Payments: Monthly, beginning January 31, 1998

Interest rate: 9% per year, compounded monthly

The payments due January 31, 2000 and February 29, 2000 were missed. Payments commencing March 31, 2000 are increased to \$K such that the loan will be completely repaid with the final payment on January 1, 2003.

In what range is \$K?

- (A) Less than \$208
- (B) \$208 but less than \$213
- (C) \$213 but less than \$218
- (D) \$218 but less than \$223
- (E) \$223 or more

Question 17

A loan of \$10,000 will be repaid with level annual installments, one at the end of each year for 15 years, at an effective annual rate of interest i such that $(1 + i)^5 = 2$

In what range is the total amount of principal repaid in the first 5 installments?

- (A) Less than \$1,300
- (B) \$1,300 but less than \$1,400
- (C) \$1,400 but less than \$1,500
- (D) \$1,500 but less than \$1,600
- (E) \$1,600 or more

Question 18

Amount of loan: \$10,000

Date of loan: January 1, 2000

Number of payments: 60

Payments: Monthly, beginning January 31, 2000

Interest rate: 9% per year, compounded monthly

Immediately after the 24th payment, the loan is refinanced at an annual interest rate of 10%, compounded semiannually. The balance will be paid in 48 equal monthly installments, beginning on January 31, 2002.

In what range is the amount of the payment due January 31, 2002?

- (A) Less than \$160
- (B) \$160 but less than \$170
- (C) \$170 but less than \$180
- (D) \$180 but less than \$190
- (E) \$190 or more

Question 19

A company establishes a fund from which a payment of \$100 will be made at the end of each year to each employee who qualifies.

Ten employees will qualify at the end of the first year; 15 at the end of the second year; 20 at the end of the third year; etc. increasing by 5 per year until the total number of qualified employees is 50, after which it will remain at 50.

The effective annual interest rate is 7%.

In what range is the lump sum that must be deposited into the fund at the beginning of the first year to provide all future payments?

- (A) Less than \$52,000
- (B) \$52,000 but less than \$54,000
- (C) \$54,000 but less than \$56,000
- (D) \$56,000 but less than \$58,000
- (E) \$58,000 or more

Question 20

Amount of loan: \$100,000

Term of loan: 30 years

Payments: Level payments of \$2,100 at the end of each quarter, with a final, larger payment.

Interest rate: 8% per year, compounded quarterly

In what range is the amount of the final payment?

- (A) Less than \$46,000
- (B) \$46,000 but less than \$48,000
- (C) \$48,000 but less than \$50,000
- (D) \$50,000 but less than \$52,000
- (E) \$52,000 or more

Question 21

Date of loan:	1/1/2000
Amount of loan:	\$60,000
Date of initial payment:	3/31/2000
Frequency of payments:	Quarterly
Number of payments:	20
Interest rate:	8% per year, compounded annually

On each March 31, the loan payment is increased to 108% of the prior year's March 31 loan payment. The payments on June 30, September 30, and December 31 are all equal to the payment made on March 31 of that year.

In what range is the amount of the payment due March 31, 2002?

- (A) Less than \$3,200
- (B) \$3,200 but less than \$3,400
- (C) \$3,400 but less than \$3,600
- (D) \$3,600 but less than \$3,800
- (E) \$3,800 or more

Question 22

Date of loan:	1/1/99
Date of initial payment:	12/31/99
Frequency of payments:	Annual
Number of payments:	30
Interest rate:	8% per year, compounded annually
Amount of principal in 5th payment:	\$100

In what range is the original amount of the loan?

- (A) Less than \$7,500
- (B) \$7,500 but less than \$8,000
- (C) \$8,000 but less than \$8,500
- (D) \$8,500 but less than \$9,000
- (E) \$9,000 or more

Question 23

Date of loan: 1/1/2000
Amount of loan: \$20,000
Rate of interest: 6% per year
Number of level payments: 10
Date of first payment: 12/31/2000

Just prior to the fourth payment, the loan is renegotiated such that the fourth installment is \$K and each subsequent payment is \$200 greater than the previous payment.

In what range is \$K?

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

Question 24

On January 1, 2000, Smith borrowed \$L at an annual interest rate of 6%, compounded semi-annually. The loan is to be repaid under either of the following options:

- Option I: 28 quarterly installments of \$P beginning on March 31, 2000
Option II: A single payment on January 1, 2007 equal to \$L plus accrued interest

Smith elects Option II and beginning March 31, 2000 has been depositing \$P quarterly into a fund earning an annual interest rate of 8%, compounded quarterly.

On January 1, 2007, the balance in the fund will be \$1,500 more than the amount due under option II.

In what range is \$L?

- (A) Less than \$12,000
- (B) \$12,000 but less than \$13,000
- (C) \$13,000 but less than \$14,000
- (D) \$14,000 but less than \$15,000
- (E) \$15,000 or more

Question 25

A lending institution makes the following series of loans:

Loan Amount	Date of Loan
\$ 1,000	May 1, 1990
2,000	May 1, 1991
3,000	May 1, 1992
.	.
.	.
.	.
9,000	May 1, 1998
10,000	May 1, 1999

Each loan is to be repaid by level annual payments at the end of each year for 10 years, at an effective annual interest rate of 9%.

In what range is the amount of principal outstanding on May 1, 1999, immediately after the loan on that date was granted and repayments due on that date were made?

- (A) Less than \$35,000
- (B) \$35,000 but less than \$37,000
- (C) \$37,000 but less than \$39,000
- (D) \$39,000 but less than \$41,000
- (E) \$41,000 or more

Question 26

Date of loan: 1/1/2000
Date of initial payment: 1/31/2000
Frequency of payments: Monthly
Number of payments: 48
Monthly payments: \$100 per month for the first 18 months, and \$300 per month for the final 30 months.
Interest rate: 12% per year, compounded monthly

In what range is the amount of principal repaid in 2001?

- (A) Less than \$1,450
- (B) \$1,450 but less than \$1,550
- (C) \$1,550 but less than \$1,650
- (D) \$1,650 but less than \$1,750
- (E) \$1,750 or more

Question 27

Date of a loan: 1/1/2000

Amount of loan: \$50,000

Date of each repayment: End of each quarter beginning 3/31/2001

Initial interest rate: 8% per year, compounded annually

Total number of payments: 60

Immediately after the 20th payment, the loan is renegotiated such that the total payments will be reduced by eight and the effective interest rate, compounded annually, is reduced to 7%.

What is the amount of interest repaid in the 12th installment after the loan is renegotiated?

- (A) Less than \$400
- (B) \$400 but less than \$500
- (C) \$500 but less than \$600
- (D) \$600 but less than \$700
- (E) \$700 or more

Question 28

Date of a loan: 1/1/2000

Amount of loan: \$200,000

Interest rate: 6% per year, compounded semiannually

Loan repayment: Interest only each 6 months, beginning on 6/30/2000, with a final payment on 12/31/2007 including the interest due on that date and the entire principal repayment.

The principal repayment is accumulated through semiannual payments to a fund each 6/30 and 12/31. The fund earns 7% per year, compounded semiannually from 2000 through 2002, and 8% per year, compounded semiannually, thereafter.

What is the amount of each payment to the fund?

- (A) Less than \$9,000
- (B) \$9,000 but less than \$10,000
- (C) \$10,000 but less than \$11,000
- (D) \$11,000 but less than \$12,000
- (E) \$12,000 or more

Question 29

Face amount of a bond: \$20,000

Purchase date: 1/1/2000

Coupon rate: 8% per year, payable semiannually.

Redemption date: 12/31/2009

Redemption amount: \$20,000

Yield rate to the purchaser: 7% per year, compounded semiannually.

In what range is the amortized value of the bond as of 1/1/2003?

- (A) Less than \$20,200
- (B) \$20,200 but less than \$20,600
- (C) \$20,600 but less than \$21,000
- (D) \$21,000 but less than \$21,400
- (E) \$21,400 or more

Question 30

Face amount of a bond: \$100,000

Purchase date: 1/1/2000

Coupon rate: 8% per year, payable quarterly on each 3/31, 6/30, 9/30 and 12/31. The coupons increase each year by 2% over the prior year's coupon amount for each date a coupon is paid.

Redemption date: 12/31/2009

Redemption amount: \$100,000

Yield rate to the purchaser: 10% per year, compounded semiannually.

In what range is the purchase price of the bond?

- (A) Less than \$88,000
- (B) \$88,000 but less than \$90,000
- (C) \$90,000 but less than \$92,000
- (D) \$92,000 but less than \$94,000
- (E) \$94,000 or more

Question 31

Face amount of a bond: \$10,000

Purchase date: 1/1/2000

Purchase price: \$9,100

Coupon rate: 8% per year, payable semiannually.

Redemption date: 12/31/2009

Redemption amount: \$10,000

In what range is the annual yield of the bond expressed as an effective annual rate?

- (A) Less than 9.1%
- (B) 9.1% but less than 9.5%
- (C) 9.5% but less than 9.9%
- (D) 9.9% but less than 10.3%
- (E) 10.3% or more

Question 32

A group of \$1,000 par value bonds is offered for sale as a “package”. Each bond in the group has annual 10½% coupons and a maturity value of \$1,050.

The bonds have staggered maturity dates, with the first maturing at the end of 11 years, the next at the end of 12 years, etc., with the last one maturing at the end of 20 years.

In what range is the purchase price of the “package” that will yield an effective annual rate of interest of 7%?

- (A) Less than \$11,000
- (B) \$11,000 but less than \$12,000
- (C) \$12,000 but less than \$13,000
- (D) \$13,000 but less than \$14,000
- (E) \$14,000 or more

Question 33

Face amount of bond:	\$10,000
Purchase date:	1/1/2000
Maturity date:	12/31/2009
Maturity value:	\$12,000
Coupon rate:	7% per year, payable semiannually
Yield rate:	9% per year, compounded semiannually

In what range is the increase in the amortized book value of the bond in 2000?

- (A) Less than \$145
- (B) \$145 but less than \$150
- (C) \$150 but less than \$155
- (D) \$155 but less than \$160
- (E) \$160 or more

Question 34

Face amount of bond:	\$100,000
Maturity date:	12/31/2009
Maturity value:	\$100,000
Annual coupon rate:	7% per year
Purchase date:	1/1/99
Call dates:	12/31/2003 for \$108,000 12/31/2006 for \$100,000

In what range is the purchase price of the bond to yield the purchaser at least 7% per year?

- (A) Less than \$100,500
- (B) \$100,500 but less than \$101,500
- (C) \$101,500 but less than \$102,500
- (D) \$102,500 but less than \$103,500
- (E) \$103,500 or more

Question 35

The following represents information concerning the purchase of two bonds.

	Bond 1	Bond 2
Face amount	\$1,000.00	\$1,000.00
Maturity value	\$1,000.00	\$1,000.00
Purchase price	\$1,043.80	\$P
Annual coupon rate	4½%	2½%
Annual yield rate	4%	4%

Each bond has the same purchase and maturity dates.

In what range is \$P?

- (A) Less than \$800
- (B) \$800 but less than \$850
- (C) \$850 but less than \$900
- (D) \$900 but less than \$950
- (E) \$950 or more

Question 36

A \$1,000 bond bought at a price of \$929.76, with an annual coupon rate of 6% to yield the purchaser 7% per year, will mature after 10 years.

In what range is the amount of the write-up in the third coupon?

- (A) Less than \$4.25
- (B) \$4.25 but less than \$4.75
- (C) \$4.75 but less than \$5.25
- (D) \$5.25 but less than \$5.75
- (E) \$5.75 or more