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

Enrolled Actuaries Basic Examination

EA-1

Date: Tuesday, May 7, 2019
Time: 8:30 a.m. – 11:00 a.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. On this examination the symbol "a" will be used to represent an annuity. On this examination the symbol "ℓ_x" will be used to represent the number of lives at age x.
5. This examination consists of 34 multiple-choice questions worth a total of 100 points. The point value for each question is shown in parentheses at the beginning of the question.
6. Your score will be based on the point values of 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.
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. 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 that 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 "Exam EA-1")

    (e) Booklet Number
    (The 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.)

    In the 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.
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.

Answer Key EA-1 Spring 2019
July 15, 2019

Question	Answer		Question	Answer
1	D		31	C
2	C		32	B
3	D		33	D
4	C		34	E
5	C			
6	D			
7	B			
8	C			
9	B			
10	B			
11	E			
12	E			
13	B			
14	B			
15	A			
16	D			
17	E			
18	E			
19	B			
20	B			
21	C			
22	A			
23	A			
24	E			
25	D			
26	A			
27	E			
28	D			
29	B			
30	B			

CONDITIONS GENERALLY APPLICABLE TO ALL EA-1 EXAMINATION QUESTIONS

If applicable, the following conditions should be considered a part of the data for each question, unless otherwise stated or implied:

(1) The normal retirement age is 65.

(2) Retirement pensions commence at normal retirement age and are paid monthly for life at the beginning of each month.

(3) There are no pre-retirement death or disability benefits.

(4) Actuarial equivalence is based on the mortality table and interest rate assumed for funding purposes.

(5) Interest rates that are compounded more frequently than annually are expressed as nominal rates.

(6) Where multiple lives are involved, future lifetimes are assumed to be independent of each other.

(7) The term “gross single premium” is equivalent to “contract single premium;” the term “net single premium” is equivalent to “single benefit premium;” the term “gross annual premium” is equivalent to “annual contract premium;” the term “net annual premium” is equivalent to “annual benefit premium.”

(8) There are no policy loans in effect.

(9) For a bond, the face amount and the redemption value are the same.

(10) Interest rate equals yield rate.

(11) The term “duration” means “Macaulay duration”.

Data for Question 1 (2 points)

$$\frac{i^{(12)}}{d^{(12)}} = 1.01$$

Question 1

In what range is the annual rate of interest compounded annually?

(A) Less than 12.2%

(B) 12.2% but less than 12.4%

(C) 12.4% but less than 12.6%

(D) 12.6% but less than 12.8%

(E) 12.8% or more

USE THIS PAGE FOR YOUR SCRATCH WORK

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Data for Question 2 (3 points)

Selected values from a mortality table:

$$q_x = 0.10$$
$$q_{x+1} = 0.15$$
$$q_{x+2} = 0.20$$

Deaths are uniformly distributed between consecutive integral ages.

$\boldsymbol{X} = {}_{1.5}q_{x+0.75}$

Question 2

In what range is $\boldsymbol{X}$?

(A) Less than 0.185

(B) 0.185 but less than 0.205

(C) 0.205 but less than 0.225

(D) 0.225 but less than 0.245

(E) 0.245 or more

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Data for Question 3 (3 points)

k	$a_{\overline{k}\rceil}$	${}_{k\mid}q_x$
0	0.0000	0.02
1	0.9000	0.03
2	1.7100	0.05
3	2.4390	0.10
4	3.0951	0.12

Question 3

In what range is $\ddot{a}_{x:\overline{3}\rceil}$?

(A) Less than 2.28

(B) 2.28 but less than 2.42

(C) 2.42 but less than 2.56

(D) 2.56 but less than 2.70

(E) 2.70 or more

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Data for Question 4 (3 points)

Each of the following sets of payments has the same present value at an annual effective interest rate of ***X***:

1) A payment of $2,000 at the end of each year for 18 years.

2) A payment of $2,500 at the end of each year for 9 years.

Question 4

In what range is ***X***?

(A) Less than 14.4%

(B) 14.4% but less than 16.4%

(C) 16.4% but less than 18.4%

(D) 18.4% but less than 20.4%

(E) 20.4% or more

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Data for Question 5 (3 points)

Selected values from a two-decrement table (death (d) and withdrawal (w)), where each decrement is distributed uniformly over each year of age:

x	$\ell_x^{(\tau)}$	$d_x^{(d)}$	$q_x'^{(d)}$
40	100,000	213	
41	93,674		0.0024
42	87,867		

X= the probability that a 40-year old will decrement out due to withdrawal before age 42.

Question 5

In what range is ***X***?

(A) Less than 0.1165

(B) 0.1165 but less than 0.1168

(C) 0.1168 but less than 0.1171

(D) 0.1171 but less than 0.1174

(E) 0.1174 or more

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Data for Question 6 (3 points)

A portfolio consists of two bonds with the same purchase price and yield rate:

	Bond A	Bond B
Face amount	\$100	\$100
Coupon rate	6%, payable semi-annually	5%, payable semi-annually
Redemption	Par	\$125
Length of bond	20 years	20 years

Question 6

In what range is the annual effective yield on the portfolio?

(A) Less than 2.18%

(B) 2.18% but less than 2.20%

(C) 2.20% but less than 2.22%

(D) 2.22% but less than 2.24%

(E) 2.24% or more

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Data for Question 7 (2 points)

Selected values from a mortality table:

$$q_{60} = 0.020$$
$$q_{61} = 0.022$$

Deaths are uniformly distributed between consecutive integral ages.

$\boldsymbol{X} = {}_{1.5}q_{60}$

Question 7

In what range is $\boldsymbol{X}$?

(A) Less than 0.0297

(B) 0.0297 but less than 0.0309

(C) 0.0309 but less than 0.0321

(D) 0.0321 but less than 0.0333

(E) 0.0333 or more

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Data for Question 8 (2 points)

Smith deposits $1,000 into a fund at the beginning of each year for 30 years.

At the end of the year in which the final deposit is made, Smith begins making annual withdrawals of X for the next 15 years.

Immediately after Smith makes the 15th withdrawal, the value of the fund is 0.

Term structure of interest rates:

Exact time t (years)	Annual interest rate
$t \leq 30$	6.50%
$t > 30$	4.00%

Question 8

In what range is X?

(A) Less than $6,000

(B) $6,000 but less than $7,000

(C) $7,000 but less than $8,000

(D) $8,000 but less than $9,000

(E) $9,000 or more

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Data for Question 9 (3 points)

A 25-year bond is purchased and redeemable at par and has 5.50% annual coupons payable at the end of the year.

X= the duration of the bond.

Question 9

In what range is ***X***?

(A) Less than 14.0

(B) 14.0 but less than 14.5

(C) 14.5 but less than 15.0

(D) 15.0 but less than 15.5

(E) 15.5 or more

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Data for Question 10 (3 points)

The following selected commutation functions use an interest rate of 5.00%:

x	D_x	N_x
45	6,121	84,997
46	5,724	78,876
…	…	…
65	1,468	16,407
66	1,358	14,939

X = the annual benefit premium for a $100,000 20-year term insurance policy issued to a 45-year old with the death benefit payable at the end of the year of death.

Question 10

In what range is ***X***?

(A) Less than $2,000

(B) $2,000 but less than $2,050

(C) $2,050 but less than $2,100

(D) $2,100 but less than $2,150

(E) $2,150 or more

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Data for Question 11 (4 points)

Smith makes deposits into an account at the end of each month for the next 10 years, each of which earns interest at an annual effective rate of 5.0%.

Each monthly deposit during the first year is $100.

The monthly deposit in each subsequent year is 3.0% greater than the monthly deposit in the preceding year.

X= the value of Smith's account at the end of 10 years.

Question 11

In what range is ***X***?

(A) Less than $12,500

(B) $12,500 but less than $14,000

(C) $14,000 but less than $15,500

(D) $15,500 but less than $17,000

(E) $17,000 or more

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Data for Question 12 (3 points)

Selected commutation functions at 5.00% interest:

x	N_x
40	14,656
41	13,698
42	12,794
43	11,943
44	11,142

Assume a uniform distribution of deaths between consecutive integral ages.

$\boldsymbol{X} = 10{,}000({}_{0.75|1.50}q_{40.50})$

Question 12

In what range is $\boldsymbol{X}$?

(A) Less than 100 ☐

(B) 100 but less than 120 ☐

(C) 120 but less than 140 ☐

(D) 140 but less than 160 ☐

(E) 160 or more ☐

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Data for Question 13 (2 points)

A pension fund has the following values and cash flows:

Date	Cash inflow (outflow)	Market Value immediately after cash flow
1/1/2019	$0	$2,000,000
3/31/2019	(20,000)	2,070,000
9/30/2019	(20,000)	2,170,000
12/31/2019	0	2,200,000

X= the dollar-weighted rate of investment return for the one-year period ending 12/31/2019.

Question 13

In what range is ***X***?

(A) Less than 12.10%

(B) 12.10% but less than 12.14%

(C) 12.14% but less than 12.18%

(D) 12.18% but less than 12.22%

(E) 12.22% or more

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Data for Question 14 (4 points)

The following annuities each have annual payments starting one year after the issue date:

Annuity	Annual payment	Present value at issue date
Annuity A	\$2,000 per year while at least one of Smith and Jones is alive.	\$34,000
Annuity B	\$4,000 per year while both Smith and Jones are alive; \$2,000 per year when exactly one of them is alive.	\$50,000
Annuity C	\$5,000 per year while both Smith and Jones are alive; \$3,000 per year when exactly one of them is alive.	***X***

Question 14

In what range is ***X***?

(A) Less than \$66,000

(B) \$66,000 but less than \$68,000

(C) \$68,000 but less than \$70,000

(D) \$70,000 but less than \$72,000

(E) \$72,000 or more

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Data for Question 15 (4 points)

Given the following loan options for a loan of $10,000:

	Option 1	Option 2
Interest rate(s) of loan	9.0% per year, compounded monthly	0.0% in the first year, 15.0% per year, compounded monthly, thereafter
Amortization term	48 months	36 months
Payment structure	Level monthly payments for 48 months	Same monthly payments as Option 1 for 36 months plus a final payment of the outstanding balance immediately after 36th monthly payment

Monthly payments commence one month after the loan is made.

X= the final payment under Option 2.

Question 15

In what range is ***X***?

(A) Less than $2,600

(B) $2,600 but less than $2,700

(C) $2,700 but less than $2,800

(D) $2,800 but less than $2,900

(E) $2,900 or more

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Data for Question 16 (3 points)

A joint and survivor annuity-due to x and y pays $\boldsymbol{R}$ per year, payable annually while both are alive, with payments doubling after the first death.

The present value of this annuity is \$116.

Selected actuarial values:

$$\ddot{a}_x = 10.00$$
$$\ddot{a}_y = 15.00$$
$$\ddot{a}_{xy} = 7.00$$

$\boldsymbol{X}$= the present value of a joint and survivor annuity-immediate to x and y that pays $\boldsymbol{R}$ per year, payable annually while both are alive, with payments reducing to $0.5\boldsymbol{R}$ after the first death.

Question 16

In what range is $\boldsymbol{X}$?

(A) Less than \$36

(B) \$36 but less than \$40

(C) \$40 but less than \$44

(D) \$44 but less than \$48

(E) \$48 or more

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Data for Question 17 (3 points)

A stock pays dividends at the end of each year, beginning one year from today for perpetuity.

The dividends for the stock are constant and the stock is priced to yield an annual effective rate of interest of 10.0%.

X= the duration of the stock.

Question 17

In what range is ***X***?

(A) Less than 7.50

(B) 7.50 but less than 8.50

(C) 8.50 but less than 9.50

(D) 9.50 but less than 10.50

(E) 10.50 or more

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Data for Question 18 (2 points)

The following values are from a life table:

x	ℓ_x
56	8,223,010
57	8,106,161
58	7,980,191
59	7,844,525
60	7,698,698
61	7,542,106
62	7,374,370
63	7,195,099
64	7,003,925
65	6,800,531
66	6,584,614
67	6,355,865

For valuation purposes, the actuary applies a 2-year setback to all ages.

Smith is currently age 58.

X= the probability that Smith dies after age 65.

Question 18

In what range is ***X***?

(A) Less than 0.825

(B) 0.825 but less than 0.840

(C) 0.840 but less than 0.855

(D) 0.855 but less than 0.870

(E) 0.870 or more

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Data for Question 19 (4 points)

The current basic life table follows the formula:

$$\ell_x^{\text{BASIC}} = 1000(110 - x), \qquad 0 \le x \le 110$$

To reflect mortality improvement, the applicable rates t years hence follow the formula:

$$q_x^{\text{PROJECTED}} = q_x^{\text{BASIC}} (0.95)^t, \qquad t = 0,1,2,\ldots$$

Smith, now age 50, purchases a 3-year annuity-immediate of $10,000 per year, payable annually. Interest: 5.0% per year, compounded annually.

X= the single premium for this annuity.

Question 19

In what range is ***X***?

(A) Less than $26,350

(B) $26,350 but less than $27,350

(C) $27,350 but less than $28,350

(D) $28,350 but less than $29,350

(E) $29,350 or more

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Data for Question 20 (3 points)

Terms of a non-callable bond:

Term to maturity	20 years
Face value	\$1,000,000
Coupons	6.00% per year, payable at end of year
Book yield to maturity	5.75% per year, compounded annually

At the end of 10 years, the term structure of interest rates is as follows:

k	k-year deferred one-year forward rate
0	4.00%
1	5.00%
2, 3, 4, …	6.00%

X= the projected unrealized gain or loss on the bond immediately after the 11th coupon is paid.

Question 20

In what range is ***X***?

(A) A loss of more than \$10,000

(B) A loss of \$10,000 or less, but more than \$5,000

(C) A loss of \$5,000 or less, but more than \$0

(D) A gain of \$0 or more, but less than \$5,000

(E) A gain of \$5,000 or more

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Data for Question 21 (4 points)

Smith (age 60) is scheduled to receive a life annuity-immediate of $10,000 per year.

When Smith dies, the annuity continues for 10 years after Smith's death.

Selected annuity value:

$\ddot{a}_{60}=12.70$

Interest rate: 5.00% per year, compounded annually.

X= the present value of the annuity.

Question 21

In what range is ***X***?

(A) Less than $148,000

(B) $148,000 but less than $149,000

(C) $149,000 but less than $150,000

(D) $150,000 but less than $151,000

(E) $151,000 or more

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Data for Question 22 (3 points)

Given the following bonds with face amount $10,000:

	Bond A	Bond B
Coupon rate:	5% per year, payable annually	10% per year, payable annually
Redemption:	Par value	Par value

Consider the following statements:

I. If the yield curve has a positive slope (i.e., the spot rate of interest increases as the length of the investment period increases), then the yield to maturity for Bond A exceeds the yield to maturity for Bond B.

II. If the yield curve is inverted (i.e., the rate of interest decreases as the length of the investment period increases), then the yield to maturity for Bond B exceeds the yield to maturity for Bond A.

III. If the yield curve is flat (i.e., the rate of interest does not change as the length of the investment period increases), then the yield to maturity for Bond B exceeds the yield to maturity for Bond A.

Question 22

Which of the following statements, if any, is/(are) true?

(A) I and II only

(B) I and III only

(C) II and III only

(D) I, II, and III

(E) The correct answer is not given by (A), (B), (C) or (D) above.

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Data for Question 23 (3 points)

For two independent lives aged x and y, you are given:

Deaths are uniformly distributed over $[0, \omega]$

x and y were both born on 1/1

$$0 < x < y < \omega$$

Question 23

Which of the following, if any, is an expression for the probability that x and y will die in the same calendar year?

(A) $\dfrac{1}{\omega - x}$

(B) $\dfrac{1}{\omega - y}$

(C) $\dfrac{\omega - y}{\omega - (y - x)}$

(D) $\dfrac{\omega - x}{\omega - (y - x)}$

(E) The correct answer is not given by (A), (B), (C) or (D) above.

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Data for Question 24 (2 points)

At the same annual effective interest rate, each of the following two sets of payments has present value ***X*** at 1/1/2019:

1) A payment of \$121 at 1/1/2019 and another payment of \$121 at 1/1/2020

2) A payment of \$144 at 1/1/2021 and another payment of \$144 at 1/1/2022

Question 24

In what range is ***X***?

(A) Less than \$218

(B) \$218 but less than \$222

(C) \$222 but less than \$226

(D) \$226 but less than \$230

(E) \$230 or more

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Data for Question 25 (3 points)

The accumulated value as of year-end of deposits of \$100 at times t=0.00 and t=0.50 is \$212.16.

The interest rate for the year is a constant.

X= the accumulated value, as of year-end, of deposits of \$50 at times

t=0.00, t=0.25, t=0.50, and t=0.75

Question 25

In what range is ***X***?

(A) Less than \$208

(B) \$208 but less than \$209

(C) \$209 but less than \$210

(D) \$210 but less than \$211

(E) \$211 or more

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Data for Question 26 (3 points)

A four-year university expects that its students will withdraw from the university in accordance with the following probabilities. All withdrawals occur at the end of a year.

Year	Probability of academic failure	Probability of transferring out	Probability of withdrawal for all other causes
1	10.0%	2.0%	2.0%
2	3.0%	8.0%	1.0%
3	2.0%	2.0%	1.0%
4	1.0%	0.0%	1.0%

Admissions to the university occur only at the beginning of year 1.

The university wants to have 1,000 graduates at the end of year 4.

X= the number of students that should be admitted each year at the beginning of year 1 so that it is expected there will always be 1,000 graduates at the end of year 4.

Question 26

In what range is ***X***?

(A) Less than 1,422

(B) 1,422 but less than 1,442

(C) 1,442 but less than 1,462

(D) 1,462 but less than 1,482

(E) 1,482 or more

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Data for Question 27 (3 points)

Given the following:

The probability that two independent lives (ages 20 and 40) both survive 20 years is $^{11}/_{15}$.

Out of 800 people alive at age 20, 96 are expected to die by age 30.

X= the probability a 30-year old dies before age 60.

Question 27

In what range is ***X***?

(A) Less than 0.150

(B) 0.150 but less than 0.155

(C) 0.155 but less than 0.160

(D) 0.160 but less than 0.165

(E) 0.165 or more

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Data for Question 28 (2 points)

Given the following information for a zero-coupon bond:

Term	10 years
Maturity value	$1,000
Yield rate	7.0%
Inflation rate	3.0%

X= the maturity value of the bond, measured in today's dollars.

Question 28

In what range is ***X***?

(A) Less than $540

(B) $540 but less than $610

(C) $610 but less than $680

(D) $680 but less than $750

(E) $750 or more

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Data for Question 29 (3 points)

Selected values from a mortality table:

X	e_x
75	10.5
76	10.0
77	9.6

X= the number of people expected to die after age 77 out of 10,000 alive at age 75.

Question 29

In what range is ***X***?

(A) Less than 9,000

(B) 9,000 but less than 9,010

(C) 9,010 but less than 9,020

(D) 9,020 but less than 9,030

(E) 9,030 or more

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Data for Question 30 (3 points)

Smith (age 35) currently earns an annual salary of $50,000.

At the end of each year, Smith invests ***X***% of his annual salary in a retirement fund with the intent to accumulate an amount equal to 6 times Smith's annual salary immediately before Smith's retirement at age 62.

Smith is expected to earn 5.0% per year, compounded annually, on the retirement fund.

Smith is expected to receive a 2.0% salary increase at the beginning of each year, with the first increase occurring at Smith's age 36.

There are no decrements before retirement.

Question 30

In what range is ***X***%?

(A) Less than 14.80%

(B) 14.80% but less than 15.00%

(C) 15.00% but less than 15.20%

(D) 15.20% but less than 15.40%

(E) 15.40% or more

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Data for Question 31 (3 points)

Mortality is one-year select and ultimate.

$\ddot{a}_{70} = 9.8269$

$p_{[70]} = 1.013(p_{70})$

Question 31

In what range is $\ddot{a}_{[70]}$?

(A) Less than 9.927

(B) 9.927 but less than 9.937

(C) 9.937 but less than 9.947

(D) 9.947 but less than 9.957

(E) 9.957 or more

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Data for Question 32 (4 points)

Terms of annuity-immediate payable annually:

Annual payment	$10,000
Number of payments	5

Spot rates on yield curve:

Payment at	Annual yield (spot rate)
1 year	2.20%
2 years	2.50%
3 years	2.70%
4 years	2.80%
5 years	2.90%

Immediately after the first payment has been made, the spot rates on the yield curve at that time equal the spot rates shown above plus 0.50%.

X = the present value of the remaining four payments immediately after the first payment has been made.

Question 32

In what range is ***X***?

(A) Less than $37,000

(B) $37,000 but less than $37,200

(C) $37,200 but less than $37,400

(D) $37,400 but less than $37,600

(E) $37,600 or more

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Data for Question 33 (3 points)

In a double-decrement model,

$$
\begin{aligned}
{}_t q'^{(1)}_x &= 0.0300t, && 0 \le t \le 1 \\
{}_t q'^{(2)}_x &= 0.0100, && t = 0 \\
{}_t q'^{(2)}_x &= 0, && 0 < t \le 1
\end{aligned}
$$

$\boldsymbol{X} = q^{(1)}_x$

Question 33

In what range is $\boldsymbol{X}$?

(A) Less than 0.0292

(B) 0.0292 but less than 0.0294

(C) 0.0294 but less than 0.0296

(D) 0.0296 but less than 0.0298

(E) 0.0298 or more

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Data for Question 34 (2 points)

The following selected commutation functions are based on an interest rate of 6.0%:

x	D_x
65	1,707
75	683
80	370
90	56

$\boldsymbol{X} = {}_{10|15}q_{65}$

Question 34

In what range is $\boldsymbol{X}$?

(A) Less than 0.40

(B) 0.40 but less than 0.45

(C) 0.45 but less than 0.50

(D) 0.50 but less than 0.55

(E) 0.55 or more

****END OF EXAMINATION****

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