

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 5, 2019

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, 2019.
5. This examination consists of 58 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 2019**  
**August 19, 2019**

<b>Question</b>	<b>Answer</b>		<b>Question</b>	<b>Answer</b>
1	B		31	B
2	B		32	B
3	B		33	C
4	C		34	B
5	D		35	C
6	C		36	B
7	C		37	D
8	D		38	C
9	B		39	D
10	B		40	B
11	B		41	A
12	C		42	C
13	A		43	B
14	A		44	D
15	B		45	C
16	A		46	C
17	C		47	B
18	C		48	D
19	A		49	D
20	D		50	D
21	D		51	A
22	B		52	C
23	B		53	D
24	B		54	A
25	B		55	B
26	B		56	B
27	B		57	A
28	A		58	A
29	B			
30	B			

Data for Question 1 (1 point)

Segment interest rates are being used for the IRC section 430 valuation.

Consider the following statement:

Stabilized segment interest rates are required to be used to determine both minimum funding requirements under IRC section 430 and maximum deductible contributions under IRC section 404.

Question 1

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 2 (1 point)

In 2015, the plan sponsor added a lump sum option to the plan.

The 2019 valuation included the assumption that optional forms of payment would be elected as follows:

Single life annuity	50%
50% J&S	25%
100% J&S	25%
Lump sum	0%

Experience has shown that 25% of the participants have taken the lump sum.

Consider the following statement:

The actuary is required to change the assumption for the election of optional forms of payment for the 2020 valuation to 25% of participants choosing a lump sum.

Question 2

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 3 (2 points)

Plan effective date: 1/1/2000

Valuation date: 1/1/2020

2019 AFTAP: 55%

2020 AFTAP: 59%

Normal retirement benefit: 1.00% of final compensation per year of service

All employees are under normal retirement age.

The plan has not been specifically amended to cease accruals.

Plan-related expenses are assumed not to be paid from the trust.

Consider the following statement:

The target normal cost as of 1/1/2020 is \$0.

Question 3

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 4 (3 points)

Valuation date: 1/1/2020

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

A plan amendment takes effect on 1/1/2020 that increases the benefit to \$120 per month per year of service for all years of service.

Segment rates for 2020: {4.00%, 5.00%, 6.00%}

Selected data for sole participant Smith:

Gender	Female
Date of birth	1/1/1978
Date of hire	1/1/2010

$\$X$  is the increase in the funding target for Smith at 1/1/2020 due to this plan amendment.

Question 4

In what range is  $\$X$ ?

- (A) Less than \$7,000
- (B) \$7,000 but less than \$7,400
- (C) \$7,400 but less than \$7,800
- (D) \$7,800 but less than \$8,200
- (E) \$8,200 or more

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Data for Question 5 (3 points)

Type of plan: Multiemployer

A plan amendment effective 1/1/2020 increased the monthly normal retirement benefit. This increased the actuarial accrued liability by \$150,000.

Actuarial cost method: Entry age normal

Valuation interest rate: 7.00%

Credit balance as of 12/31/2019: \$75,000

Selected information as of 1/1/2020:

Normal cost (after amendment)	\$21,000
Amortization charges (before amendment)	60,000
Amortization credits	37,000

Sole contribution for 2020 plan year made on 3/1/2021: \$105,000

Question 5

In what range is the credit balance as of 12/31/2020?

- (A) Less than \$111,000
- (B) \$111,000 but less than \$116,000
- (C) \$116,000 but less than \$121,000
- (D) \$121,000 but less than \$126,000
- (E) \$126,000 or more

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Data for Question 6 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Credit balance at 12/31/2019: \$0

Actuarial cost method: Projected unit credit

Normal retirement benefit: 1.10% of final three-year average compensation per year of service

Valuation interest rate: 7.00%

Assumed rate of compensation increases:

Valuation date	<u>1/1/2019</u>	<u>1/1/2020</u>
	3.00%	2.50%

There are no assumed pre-retirement decrements other than mortality.

Actuarial (market) value of assets at 1/1/2020: \$110,000

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1960
Date of hire	1/1/1998
2017 compensation	\$60,000
2018 compensation	62,000
2019 compensation	65,000

**\$X** is the absolute value of the change in the required contribution at 12/31/2020 for the 2020 plan year due to the compensation assumption change for Smith.

Question 6

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

- (A) Less than \$300
- (B) \$300 but less than \$375
- (C) \$375 but less than \$450
- (D) \$450 but less than \$525
- (E) \$525 or more

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Data for Question 7 (2 points)

A plan is in at-risk status for 5 consecutive years, including the current plan year.

Consider the following statements regarding the special retirement age assumptions required to determine the at-risk funding target:

- I. All active participants are assumed to elect the normal form of benefit at retirement.
- II. The special retirement age assumptions do not affect termination of employment assumptions prior to the employee's earliest retirement age.
- III. All active participants are assumed to commence an immediate distribution at the earliest retirement age under the plan.

Question 7

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

- (A) None
- (B) I only
- (C) II only
- (D) III only
- (E) The correct answer is not given by (A), (B), (C), or (D) above

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Data for Question 8 (3 points)

There was no funding shortfall in 2018.

Selected information as of 1/1/2019:

Prefunding balance	\$100,000
Minimum required contribution	100,000
Effective interest rate	6.00%

Actual rate of return on assets during 2019: 1.00%

Sole contribution for the 2019 plan year made on 7/1/2019: \$150,000

**\$X** is the prefunding balance as of 1/1/2020.

Question 8

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

- (A) Less than \$147,000
- (B) \$147,000 but less than \$148,000
- (C) \$148,000 but less than \$149,000
- (D) \$149,000 but less than \$150,000
- (E) \$150,000 or more

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Data for Question 9 (2 points)

Valuation date: 1/1/2020

Prefunding balance as of 1/1/2020: \$75,000

Consider the following funding balance elections:

- I. On 2/1/2020, the plan sponsor makes an election to apply a portion of the prefunding balance to offset the remaining 2019 minimum required contribution.
- II. On 4/15/2020, the plan sponsor makes an election to apply a portion of the prefunding balance to offset the quarterly installment due on 4/15/2020.
- III. On 7/1/2020, the actuary certifies the 2020 AFTAP resulting in a deemed reduction of the prefunding balance.

Question 9

From first to last, in what order are these funding balance elections taken into account?

- (A) I, II, III
- (B) I, III, II
- (C) II, I, III
- (D) III, I, II
- (E) The correct answer is not given by (A), (B), (C), or (D) above

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Data for Question 10 (4 points)

Type of plan: Multiemployer

Actuarial cost method: Projected unit credit

Normal retirement benefit: 1.30% of final year's compensation per year of service

Early retirement eligibility: Age 62

Early retirement reduction: 5.00% for each year that the benefit commencement date precedes age 65

No pre-retirement decrements are assumed.

Actuarial assumptions for 1/1/2020 valuation:

Interest rate	6.00%
Rate of compensation increases	3.50% per year

Retirement rates:

<u>Age</u>	<u>Rate</u>
62	40%
65	100%

The assumed rate of retirement is 0% at all other ages.

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1961
Date of hire	1/1/2010
2019 compensation	\$95,000

Question 10

In what range is the normal cost as of 1/1/2020 for Smith?

- (A) Less than \$11,000
- (B) \$11,000 but less than \$12,500
- (C) \$12,500 but less than \$14,000
- (D) \$14,000 but less than \$15,500
- (E) \$15,500 or more

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Data for Question 11 (4 points)

Valuation date: 1/1/2020

Asset valuation method: The average of the market value of assets on the valuation date and the adjusted market value of assets for the preceding valuation date

Selected information:

	<u>2019 plan year</u>	<u>2020 plan year</u>
Segment rates	{4.00%, 5.00%, 6.00%}	{3.00%, 4.00%, 5.00%}
Effective interest rate	5.00%	4.00%

Assumed rate of return on assets for 2019: 7.50%

Selected asset information, excluding contributions receivable for the 2019 plan year:

	<u>2019</u>	<u>2020</u>
Market value of assets, 1/1	\$600,000	\$500,500
Benefit payments	30,000	
Expenses paid from trust	7,500	

Benefit payments and expenses are assumed to be paid on 7/1/2019.

There were no contributions made during 2019 for the 2018 plan year.

Contributions for the 2019 plan year:

<u>Date</u>	<u>Amount</u>
10/1/2019	\$15,000
9/15/2020	40,000

Question 11

In what range is the actuarial value of assets as of 1/1/2020?

- (A) Less than \$593,000
- (B) \$593,000 but less than \$594,000
- (C) \$594,000 but less than \$595,000
- (D) \$595,000 but less than \$596,000
- (E) \$596,000 or more

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Data for Question 12 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Aggregate

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

Valuation interest rate: 6.00%

Credit balance as of 12/31/2019: \$75,000

Actuarial (market) value of assets as of 1/1/2020: \$400,000

Selected data for all 10 participants:

Gender	Male
Date of birth	1/1/1970
Date of hire	1/1/2010
Status	Active

$\$X$  is the normal cost as of 1/1/2020.

Question 12

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 13 (1 point)

Valuation date: 1/1/2020

The IRS approved a waiver of the entire 2019 minimum required contribution.

Consider the following statement:

The waiver amortization installment is calculated using the segment rates for 2019.

Question 13

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 14 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Unit credit

Valuation interest rate: 7.00%

Credit balance as of 12/31/2019: \$250,000

Selected information as of 1/1/2020:

Normal cost	\$1,000,000
Net amortization charge	500,000

The plan is not in critical or endangered status as of 1/1/2020.

Sole contribution for 2020 plan year made on 12/31/2020: \$1,000,000

**\$X** is the amount of the initial excise tax, if any, that must be paid for failing to meet minimum funding standards for the 2020 plan year.

Question 14

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

- (A) Less than \$19,000
- (B) \$19,000 but less than \$23,000
- (C) \$23,000 but less than \$27,000
- (D) \$27,000 but less than \$31,000
- (E) \$31,000 or more

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Data for Question 15 (3 points)

Valuation date: 1/1/2020

A plan amendment increasing benefits was adopted in 2019 and effective 1/1/2019.

Selected valuation information as of 1/1/2020:

Actuarial (market) value of assets	\$600,000
IRC 404 funding target before amendment	400,000
IRC 404 funding target after amendment	475,000
IRC 404 target normal cost	250,000
Minimum required contribution	100,000
Increase in IRC 404 funding target due to salary increases before amendment	60,000
Increase in IRC 404 funding target due to salary increases after amendment	60,000
Effective interest rate	3.00%
Number of participants	75

All participants are highly compensated employees.

$\$X$  is the deduction limit for 2020, disregarding the at-risk floor on the deduction limit.

Question 15

In what range is  $\$X$ ?

- (A) Less than \$350,000
- (B) \$350,000 but less than \$400,000
- (C) \$400,000 but less than \$450,000
- (D) \$450,000 but less than \$500,000
- (E) \$500,000 or more

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Data for Question 16 (4 points)

Valuation date: 1/1/2020

Selected valuation results as of 1/1/2019:

Minimum required contribution	\$520,000
Effective interest rate	5.00%

Prefunding balance as of 1/1/2020: \$200,000

Selected valuation results as of 1/1/2020:

Minimum required contribution	\$610,000
Effective interest rate	6.50%

Quarterly installments are required for the 2020 plan year.

Contribution for the 2020 plan year made on 4/1/2020: \$150,000

No other contributions were made for the 2020 plan year until 10/15/2020.

The plan sponsor elects to use available funding balances to offset the remaining quarterly installments for the 2020 plan year on 6/1/2020.

$\$X$  is the contribution to be made on 10/15/2020 in the smallest amount to satisfy the third quarterly installment.

Question 16

In what range is  $\$X$ ?

- (A) Less than \$31,000
- (B) \$31,000 but less than \$31,700
- (C) \$31,700 but less than \$32,400
- (D) \$32,400 but less than \$33,100
- (E) \$33,100 or more

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Data for Question 17 (2 points)

Valuation date: 1/1/2020

Selected information as of 1/1/2019:

Prefunding balance	\$3,000
Actuarial (market) value of assets	154,000
Funding target	153,000
Minimum required contribution	6,000

Selected information as of 1/1/2020:

Prefunding balance	\$5,000
Actuarial (market) value of assets	175,000
Funding target	165,000
Minimum required contribution	8,000

$\$X$  is the required quarterly installment for the 2020 plan year.

Question 17

In what range is  $\$X$ ?

- (A) Less than \$900
- (B) \$900 but less than \$1,400
- (C) \$1,400 but less than \$1,900
- (D) \$1,900 but less than \$2,400
- (E) \$2,400 or more

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Data for Question 18 (5 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Projected unit credit

Retirement benefit: 1.00% of final 3-year average compensation per year of service, reduced by 5.00% for each year that the benefit commencement date precedes age 65

Actuarial assumptions for the 1/1/2020 valuation:

Interest rate	7.00%
Rate of compensation increases	3.00%
Assumed rates of retirement:	

<u>Age</u>	<u>Rate</u>
62	20%
65	100%

The assumed rates of retirement are 0% at all other ages.

There are no assumed pre-retirement decrements other than mortality.

Selected data for participant Smith:

Gender	Male		
Date of birth	1/1/1960		
Date of hire	1/1/2015		
Compensation	<u>2017</u>	<u>2018</u>	<u>2019</u>
	\$50,000	\$51,000	\$52,000

$\$X$  is the actuarial accrued liability for Smith as of 1/1/2020.

Question 18

In what range is  $\$X$ ?

- (A) Less than \$20,000
- (B) \$20,000 but less than \$20,600
- (C) \$20,600 but less than \$21,200
- (D) \$21,200 but less than \$21,800
- (E) \$21,800 or more

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Data for Question 19 (1 point)

Consider the following statement regarding the calculation of the liquidity shortfall:

The cap on the liquidity shortfall is the amount that, when added to prior installments for the plan year, is necessary to increase the FTAP of the plan for the plan year (taking into account the expected increase in funding target due to benefits accruing or earned during the plan year) to 100%.

Question 19

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 20 (4 points)

Valuation date: 1/1/2020

2019 minimum required contribution: \$800,000

2020 minimum required contribution: \$1,000,000

2020 prefunding balance: \$0

Effective interest rate for 2020: 5.00%

The first three quarterly contributions for the 2020 plan year are made on their due dates.

No further contributions are made until 9/15/2021.

**$\$X$**  is the **smallest amount that satisfies the minimum funding standard** as of 9/15/2021 for the 2020 plan year.

Question 20

In what range is  $\$X$ ?

- (A) Less than \$427,000
- (B) \$427,000 but less than \$440,000
- (C) \$440,000 but less than \$453,000
- (D) \$453,000 but less than \$466,000
- (E) \$466,000 or more

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Data for Question 21 (3 points)

A plan has 5,000 active participants.

The plan properly suspends benefits post normal retirement date and does not provide actuarial increases.

The plan is amended to provide for the greater of actuarial increases or continued accruals after normal retirement.

In addition, eligibility for post-retirement medical benefits is increased from age 60 to 62.

Assumed retirement rates (before plan changes):

<u>Age</u>	<u>Rate</u>
55-59	6%
60-61	20%
62	25%
63-64	10%
65	100%

The actuary made the following changes to the assumed retirement rates to reflect the plan changes:

- I. The actuary reduced the rates at ages 60 and 61
- II. The actuary increased the rate at age 62
- III. The actuary reduced the rate at age 65 and extended the table.

Question 21

Which, if any, of the above statements describe a reasonable change to assumed retirement rates?

- (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 22 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Entry age normal

Valuation interest rate: 6.00%

Credit balance as of 12/31/2019: \$20,000

For the 2020 valuation, the actuary changes the assumed retirement rates for the plan.

Amortization amounts as of 1/1/2020 (prior to assumption change):

Total amortization charges	\$200,000
Total amortization credits	140,000

Selected valuation results as of 1/1/2020:

Actuarial accrued liability (prior to assumption change)	\$1,000,000
Actuarial accrued liability (after assumption change)	1,100,000
Normal cost (after assumption change)	250,000

**\$X** is the **smallest amount that satisfies the minimum funding standard** that can be contributed on 12/31/2020 for the 2020 plan year.

Question 22

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

- (A) Less than \$305,000
- (B) \$305,000 but less than \$320,000
- (C) \$320,000 but less than \$335,000
- (D) \$335,000 but less than \$350,000
- (E) \$350,000 or more

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Data for Question 23 (1 point)

Optional form of payment: Lump sum determined using the applicable mortality table and applicable interest rates

Assumed form of payment: 100% lump sum

No participants are affected by the IRC section 415 limits.

The plan has never been top-heavy.

Consider the following statement regarding the calculation of the plan's funding target:

The actuary must substitute the applicable interest rates under IRC section 417(e)(3) for the valuation interest rates.

Question 23

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 24 (1 point)

Type of plan: Multiemployer

Actuarial cost method: Entry age normal

The plan is amended 1/1/2020 to provide a lump sum payment, in addition to the retiree's monthly annuity, of \$1,000 for each retiree as of 1/1/2020, 1/1/2021, and 1/1/2022.

Consider the following statement:

The increase in the past service liability that arises from this amendment is amortized over 15 years.

Question 24

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 25 (1 point)

Consider the following statement:

In determining the prefunding balance of a plan for the current plan year, the prior plan year prefunding balance is adjusted by the rate of return on plan assets for the prior plan year determined on the basis of the actuarial value of assets.

Question 25

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 26 (1 point)

Valuation date: 1/1/2020

The plan sponsor timely filed for a Form 5500 extension using Form 5558. Therefore, the due date for the 2020 plan year Form 5500 is 10/15/2021.

Consider the following statement:

The plan sponsor may elect to add to the plan's prefunding balance for the 2020 plan year on 10/15/2021.

Question 26

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 27 (2 points)

Valuation date: 1/1/2020

Selected information as of 1/1/2019:

Funding balances	\$0
Actuarial (market) value of assets	500,000
Funding target	490,000
Minimum required contribution	54,000

The 2020 minimum required contribution is \$70,000.

Consider the following statement:

The required quarterly installment for the 2020 plan year is \$13,500.

Question 27

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 28 (1 point)

Consider the following statement regarding the calculation of the liquidity shortfall:

The base amount for a quarter is 3 times the adjusted disbursements for the 12-month period ending on the last day of the quarter.

Question 28

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 29 (4 points)

Valuation date: 1/1/2020

A plan provides benefits only at normal retirement age, and a lump sum option calculated using the applicable interest rate and applicable mortality is available.

Valuation segment rates for 2020: {5.00%, 6.00%, 7.00%}

IRC section 417(e) segment rates for 2020: {3.00%, 4.00%, 5.00%}

The actuary assumes 50% of participants elect a lump sum and 50% of participants elect a single life annuity.

The plan has fewer than 100 participants.

Selected data for participant Smith as of 1/1/2020:

Gender	Male
Age	45
Monthly accrued benefit	\$3,500

$\ddot{a}_{65}^{(12)}$  using IRC section 417(e) mortality:

<u>Interest rate</u>	<u>Factor</u>
4.00%	13.88
5.00%	12.65
6.00%	11.59
7.00%	10.68

$\$X$  is the funding target for Smith as of 1/1/2020.

Question 29

In what range is  $\$X$ ?

- (A) Less than \$100,000
- (B) \$100,000 but less than \$115,000
- (C) \$115,000 but less than \$130,000
- (D) \$130,000 but less than \$145,000
- (E) \$145,000 or more

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Data for Question 30 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Projected unit credit

Normal retirement benefit: 2.00% of final three-year average compensation per year of Service

Valuation interest rate: 5.00%

Assumed rate of compensation increases: 3.00% per year

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1960
Date of hire	1/1/2014
Compensation for 2019	\$30,000

Question 30

In what range is the normal cost for Smith as of 1/1/2020?

- (A) Less than \$6,400
- (B) \$6,400 but less than \$6,500
- (C) \$6,500 but less than \$6,600
- (D) \$6,600 but less than \$6,700
- (E) \$6,700 or more

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Data for Question 31 (3 points)

Valuation date: 1/1/2020

Asset valuation method: Market value

Effective interest rate:

2019 plan year 5.50%

2020 plan year 6.50%

Actual rate of return on assets during 2019: 4.00%

Market value of assets as of 1/1/2020 (excluding receivable contributions): \$750,000

Contributions made for the 2019 plan year:

<u>Date</u>	<u>Amount</u>
7/1/2019	\$5,000
9/1/2020	200,000

$\$X$  is the actuarial value of assets for the 1/1/2020 valuation.

Question 31

In what range is  $\$X$ ?

- (A) Less than \$942,000
- (B) \$942,000 but less than \$943,000
- (C) \$943,000 but less than \$944,000
- (D) \$944,000 but less than \$945,000
- (E) More than \$945,000

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Data for Question 32 (4 points)

Valuation date: 1/1/2020

Segment rates for 2019 and 2020: {5.00%, 6.00%, 7.00%}

There were no shortfall amortization bases prior to 1/1/2019.

Shortfall amortization installment for 2019 funding shortfall: \$36,328

The plan received a waiver of \$70,000 for the 2019 plan year minimum required contribution.

Selected information as of 1/1/2020:

Funding balances	\$0
Actuarial value of assets	150,000
Funding target	340,000
Target normal cost	50,000

**\$X** is the minimum required contribution as of 1/1/2020.

Question 32

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

- (A) Less than \$89,700
- (B) \$89,700 but less than \$90,100
- (C) \$90,100 but less than \$90,500
- (D) \$90,500 but less than \$90,900
- (E) \$90,900 or more

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Data for Question 33 (3 points)

Valuation date: 1/1/2020

Selected information as of 1/1/2020:

Funding standard carryover balance	\$270,000
Prefunding balance	520,000
Actuarial (market) value of assets, before receivable	12,000,000
Funding target	11,300,000
Target normal cost	1,800,000

Effective interest rate for 2019 and 2020: 6.00%

Sole contribution for the 2019 plan year made on 7/1/2020: \$600,000

On 1/1/2020, the plan sponsor elects to apply \$270,000 in funding balances to offset the minimum required contribution for the 2020 plan year. This was the only funding balance election made for the 2020 plan year.

**\$X** is the contribution on 1/1/2020 that would be needed to satisfy the remainder of the minimum required contribution, after reflecting the election to apply funding balances for the 2020 plan year.

Question 33

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

- (A) Less than \$750,000
- (B) \$750,000 but less than \$1,000,000
- (C) \$1,000,000 but less than \$1,250,000
- (D) \$1,250,000 but less than \$1,500,000
- (E) \$1,500,000 or more

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Data for Question 34 (3 points)

Valuation date: 1/1/2020

Normal retirement benefit: 1.20% of final year's compensation per year of service

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

Assumed rate of compensation increases: 3.00% per year

Selected data for participant Smith:

Gender	Female
Date of birth	1/1/1970
Date of hire	1/1/2010
2018 compensation	\$100,000
2019 compensation	115,000

$\$X$  is the funding target for Smith as of 1/1/2020.

$\$Y$  is the funding target for Smith as of 1/1/2020 that would have been determined had Smith's 2019 compensation equaled the expected 2019 compensation based on Smith's 2018 compensation.

Question 34

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

- (A) Less than \$9,300
- (B) \$9,300 but less than \$11,300
- (C) \$11,300 but less than \$13,300
- (D) \$13,300 but less than \$15,300
- (E) \$15,300 or more

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Data for Question 35 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Projected unit credit

Normal retirement benefit: 1.00% of final three-year average compensation per year of service

Selected actuarial assumptions:

Interest rate	7.00%
Annual compensation increases	3.00%

There were no assumption changes from the prior year.

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1961
Date of hire	1/1/2003
2018 compensation	\$62,000
2019 compensation	64,500

$\$X$  is the absolute value of the change in the actuarial accrued liability as of 1/1/2020 due to Smith's actual 2019 compensation being different from Smith's assumed compensation.

Question 35

In what range is  $\$X$ ?

- (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

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Data for Question 36 (5 points)

Type of plan: Multiemployer

Actuarial cost method: Projected unit credit

Valuation interest rate: 7.00%

The sponsor elected the special amortization under IRC section 431(b)(8)(A) of the experience attributable to net investment losses established in 2009.

All amortization charges and credits as of 1/1/2019:

	<u>Years</u> <u>remaining</u>	<u>Outstanding</u> <u>balance</u>
Charge base due to plan amendment	2	\$1,500,000
Actuarial gain	14	900,000
Actuarial loss	15	1,100,000
Special amortization base	19	8,000,000

Effective 1/1/2020, the plan is amended to eliminate future benefit accruals. This decreases the actuarial accrued liability by \$1,600,000.

The plan receives approval as of 1/1/2020 for an automatic 5-year extension of amortization periods for charge bases established before 1/1/2020.

$\$X$  is the amortization charges less amortization credits as of 1/1/2020 before the automatic extension.

$\$Y$  is the amortization charges less amortization credits as of 1/1/2020 after the automatic extension.

Question 36

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

- (A) Less than \$640,000
- (B) \$640,000 but less than \$660,000
- (C) \$660,000 but less than \$680,000
- (D) \$680,000 but less than \$700,000
- (E) \$700,000 or more

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Data for Question 37 (4 points)

Valuation date: 1/1/2020

The plan provides a supplemental benefit of \$400 per month payable until age 65 for participants who retire on or after age 62 with at least 15 years of service.

Segment rates for 2020: {5.00%, 6.00%, 7.00%}

No pre-retirement decrements assumed.

Assumed rates of retirement:

<u>Age</u>	<u>Rate</u>
Under 62	0%
62	50%
63	0%
64	0%
65	100%

Selected data for sole participant Smith:

Gender	Male
Date of birth	1/1/1960
Date of hire	1/1/2005

$\$X$  is the portion of the funding target for Smith at 1/1/2020 attributable to this supplemental benefit.

Question 37

In what range is  $\$X$ ?

- (A) Less than \$4,250
- (B) \$4,250 but less than \$4,750
- (C) \$4,750 but less than \$5,250
- (D) \$5,250 but less than \$5,750
- (E) \$5,750 or more

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Data for Question 38 (3 points)

Valuation date: 1/1/2020

At-risk status for plan years:

2016	At-risk
2017	At-risk
2018	Not at-risk
2019	Not at-risk
2020	At-risk

Selected information as of 1/1/2020 disregarding load and phase-in:

Funding target without regard to at-risk assumptions	\$1,000,000
At-risk funding target without regard to load	1,240,000
Number of participants (for all years)	550

$\$X$  is the funding target for the 2020 plan year.

Question 38

In what range is  $\$X$ ?

- (A) Less than \$1,000,000
- (B) \$1,000,000 but less than \$1,067,000
- (C) \$1,067,000 but less than \$1,134,000
- (D) \$1,134,000 but less than \$1,201,000
- (E) \$1,201,000 or more

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Data for Question 39 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Unit credit

Valuation interest rate: 7.00%

Selected information as of 1/1/2020:

Market value of assets	\$1,300,000
Actuarial value of assets	1,500,000
Actuarial accrued liability	2,000,000
Normal cost	40,000
Actuarial gain during 2019	50,000

Funding standard account information as of 1/1/2020 (excluding the actuarial gain during 2019):

Outstanding balance of amortization charges	\$925,000
Amortization charges	100,000
Outstanding balance of amortization credits	300,000
Amortization credits	60,000

Sole contribution for the 2020 plan year made on 2/1/2020: \$86,500

**\$X** is the credit balance as of 12/31/2020.

Question 39

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

- (A) Less than \$30,000
- (B) \$30,000 but less than \$60,000
- (C) \$60,000 but less than \$90,000
- (D) \$90,000 but less than \$120,000
- (E) \$120,000 or more

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Data for Question 40 (3 points)

Valuation date: 1/1/2020

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

Prefunding balance as of 1/1/2020: \$75,000

Effective interest rate for 2020 plan year: 6.50%

Required quarterly installments for 2020 plan year: \$50,000

On 1/1/2020, the plan sponsor makes an election to apply the entire prefunding balance to offset the minimum required contribution for the 2020 plan year.

**\$X** is the smallest amount required to be paid on 7/15/2020 to satisfy the 7/15/2020 quarterly installment.

Question 40

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

- (A) Less than \$23,000
- (B) \$23,000 but less than \$23,500
- (C) \$23,500 but less than \$24,000
- (D) \$24,000 but less than \$24,500
- (E) \$24,500 or more

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Data for Question 41 (1 point)

A plan amendment increasing benefits is adopted before the first day of the 2020 plan year and takes effect on the first day of the 2020 plan year.

2020 AFTAP (after amendment): 85%

Consider the following statement:

The plan amendment must be reflected in the 2020 funding valuation.

Question 41

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 42 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Entry age normal

Normal retirement benefit: \$150 per month per year of service

Valuation interest rate: 7.00%

Selected data for participant Smith:

Gender	Female
Date of birth	1/1/1958
Date of hire	1/1/2005

$\$X$  is the actuarial accrued liability for Smith as of 1/1/2020.

Question 42

In what range is  $\$X$ ?

- (A) Less than \$235,000
- (B) \$235,000 but less than \$250,000
- (C) \$250,000 but less than \$265,000
- (D) \$265,000 but less than \$280,000
- (E) \$280,000 or more

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Data for Question 43 (2 points)

The plan provides a Social Security level income option.

2019 AFTAP: 85%

Selected information as of 1/1/2020:

Funding standard carryover balance	\$7,000
Prefunding balance	10,000
Actuarial (market) value of assets	300,000

As of 4/1/2020, the actuary has not issued a 2020 AFTAP certification.

Consider the following statement:

As of 4/1/2020, the funding balances are deemed to be reduced to avoid benefit restrictions.

Question 43

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 44 (4 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Projected unit credit

Normal retirement benefit: \$160 per month per year of service

Early retirement benefit before amendment: Accrued benefit reduced 4.00% for each year that the benefit commencement date precedes age 65

Early retirement benefit after amendment: Unreduced accrued benefit, plus a supplement payable until age 65 of \$32 per month per year of service

Selected assumptions as of 1/1/2020:

Valuation interest rate	6.00%
Preretirement decrements other than death	None
Retirement age	60

Selected data for participant Smith:

Gender	Male
Date of birth	1/1/1970
Date of hire	1/1/1995

Selected commutation function at 6%:  $D_{50} = 53,487$

$\$X$  is the change in accrued liability for Smith as of 1/1/2020 due to the amendment.

Question 44

In what range is  $\$X$ ?

- (A) Less than \$25,000
- (B) \$25,000 but less than \$50,000
- (C) \$50,000 but less than \$75,000
- (D) \$75,000 but less than \$100,000
- (E) \$100,000 or more

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Data for Question 45 (3 points)

Valuation date: 1/1/2020

Selected information as of 1/1/2020:

Prefunding balance	\$20,000
Actuarial (market) value of assets	1,900,000
Funding target	1,860,000
Present value of all benefits expected to accrue during the year	100,000
Expected plan-related expenses to be paid from the plan during the plan year	10,000
Expected mandatory employee contributions during the plan year	7,000

**\$X** is the minimum required contribution as of 1/1/2020.

Question 45

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

- (A) Less than \$70,000
- (B) \$70,000 but less than \$80,000
- (C) \$80,000 but less than \$90,000
- (D) \$90,000 but less than \$100,000
- (E) \$100,000 or more

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Data for Question 46 (3 points)

Type of plan: Statutory hybrid (cash balance)

Valuation date: 1/1/2020

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

Interest crediting rate: 5.00% per year

Interest credits are based on the account balance as of the beginning of the year.

Pay credits and interest credits are credited at the end of the year.

Assumed form of payment: Lump sum

Selected data for sole participant Smith:

Date of birth	1/1/1974
Pay credit for 2020	\$5,000

$\$X$  is the target normal cost for Smith as of 1/1/2020.

Question 46

In what range is  $\$X$ ?

- (A) Less than \$3,500
- (B) \$3,500 but less than \$3,750
- (C) \$3,750 but less than \$4,000
- (D) \$4,000 but less than \$4,250
- (E) \$4,250 or more

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Data for Question 47 (1 point)

A plan sponsor has two plans, Plan A and Plan B.

The number of deaths during the most recent experience study period:

Plan A	400
Plan B	80

Consider the following statement:

Each plan may use its own substitute mortality table to determine the minimum required contribution.

Question 47

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 48 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Asset valuation method: Smoothed market value using a smoothing period of four years, as described in Rev. Proc. 2000-40

	<u>1/1/2019</u>	<u>1/1/2020</u>
Market value of assets:	\$10,000,000	\$9,000,000

Valuation interest rate: 7.00%

Sole contribution for 2019 plan year made on 7/1/2019: \$1,500,000

Benefit payments paid on 7/1/2019: \$200,000

Administrative expenses paid on 7/1/2019: \$40,000

Asset gain/loss amounts:

Gain during 2017	\$200,000
Gain during 2018	400,000

**\$X** is the actuarial value of assets as of 1/1/2020.

Question 48

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

- (A) Less than \$8,750,000
- (B) \$8,750,000 but less than \$9,500,000
- (C) \$9,500,000 but less than \$10,250,000
- (D) \$10,250,000 but less than \$11,000,000
- (E) \$11,000,000 or more

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Data for Question 49 (3 points)

Valuation date: 1/1/2020

Selected information as of 1/1/2019:

Funding standard carryover balance	\$23,000
Prefunding balance	3,000
Minimum required contribution	18,000
Effective interest rate	5.00%

Actual rate of return on assets during 2019: 7.00%

On 1/1/2019, the plan sponsor elected to apply \$18,000 of the funding balances toward the 2019 minimum required contribution.

Sole contribution for 2019 plan year made on 12/31/2019: \$26,000

**\$X** is the prefunding balance as of 1/1/2020.

Question 49

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

- (A) Less than \$29,100
- (B) \$29,100 but less than \$29,300
- (C) \$29,300 but less than \$29,500
- (D) \$29,500 but less than \$29,700
- (E) \$29,700 or more

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Data for Question 50 (5 points)

Valuation date: 1/1/2020

A plan amendment that increases benefits for all years of service is adopted and takes effect on 1/1/2020.

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

Normal retirement benefit after amendment: \$130 per month per year of service

Prefunding balance as of 1/1/2020: \$0

Segment rates for 2020 valuation: {3.00%, 4.00%, 5.00%}

There are no assumed pre-retirement decrements other than mortality.

Actuarial value of assets as of 1/1/2020: \$210,000

There were no shortfall amortization bases prior to 1/1/2020.

Selected data for sole participant Smith:

Gender	Female
Date of birth	1/1/1960
Date of hire	1/1/2005

**\$X** is the increase in the **minimum required contribution** due to the 2020 plan amendment.

Question 50

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

- (A) Less than \$13,000
- (B) \$13,000 but less than \$17,000
- (C) \$17,000 but less than \$21,000
- (D) \$21,000 but less than \$25,000
- (E) \$25,000 or more

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Data for Question 51 (2 points)

Valuation date: 1/1/2020

Selected information as of 1/1/2020:

Funding standard carryover balance	\$10,000
Prefunding balance	25,000
Actuarial (market) value of assets	915,000
Funding target	900,000

The plan sponsor does not elect to use any funding balances to offset the minimum required contribution for the 2020 plan year.

Consider the following statement:

The plan is exempt from the requirement to establish a new shortfall amortization base for the 2020 plan year.

Question 51

Is the above statement true or false?

(A) True

(B) False

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Data for Question 52 (3 points)

Valuation date: 1/1/2020

Prefunding balance as of 1/1/2020: \$0

Effective interest rate for the 2020 plan year: 6.00%

Actual rate of return on assets during 2020: 3.00%

Minimum required contribution for 2020 plan year: \$100,000

Sole contribution for 2020 plan year made on 6/30/2021: \$50,000

**\$X** is the initial excise tax due on the unpaid minimum required contribution for the 2020 plan year under IRC section 4971(a).

Question 52

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

- (A) Less than \$3,300
- (B) \$3,300 but less than \$5,300
- (C) \$5,300 but less than \$7,300
- (D) \$7,300 but less than \$9,300
- (E) \$9,300 or more

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Data for Question 53 (4 points)

Valuation date: 1/1/2020

There were no shortfall amortization bases prior to 1/1/2019.

Shortfall amortization charge for the plan year beginning 1/1/2019: \$100,000

The 2020 plan year AFTAP is first certified on 9/15/2020.

Prefunding balance as of 1/1/2020 (before reduction): \$150,000

There is a \$50,000 deemed reduction to the prefunding balance on 4/1/2020 to avoid the limitation on accelerated benefit distributions under IRC section 436(d).

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

Selected information as of 1/1/2020:

Actuarial (market) value of assets	\$1,000,000
Funding target	1,300,000
Target normal cost	300,000
Effective interest rate	6.25%

**\$X** is the **smallest amount that satisfies the minimum funding standard** that can be contributed on 4/15/2020 for the 2020 plan year.

Question 53

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

- (A) Less than \$260,000
- (B) \$260,000 but less than \$270,000
- (C) \$270,000 but less than \$280,000
- (D) \$280,000 but less than \$290,000
- (E) \$290,000 or more

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Data for Question 54 (2 points)

Valuation date: 1/1/2020

The plan sponsor elected to apply funding relief using a 15-year amortization schedule for the shortfall amortization base established for the 2011 plan year.

The shortfall amortization installment for this shortfall base for 2020 is \$200,000.

There have been no installment acceleration amounts.

Segment rates for 2011: {3.00%, 4.00%, 5.00%}

Segment rates for 2020: {5.00%, 6.00%, 7.00%}

$\$X$  is the outstanding balance of this base as of 1/1/2020.

Question 54

In what range is  $\$X$ ?

- (A) Less than \$1,075,000
- (B) \$1,075,000 but less than \$1,125,000
- (C) \$1,125,000 but less than \$1,175,000
- (D) \$1,175,000 but less than \$1,225,000
- (E) \$1,225,000 or more

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Data for Question 55 (4 points)

Plan effective date: 1/1/2015

Valuation date: 1/1/2020

Segment rates for 2020: {5.00%, 6.00%, 7.00%}

The plan has been at-risk only in 2017, 2018, and 2020.

Selected information as of 1/1/2020 disregarding any loads and phase-in:

Prefunding balance	\$500,000
Actuarial (market) value of assets	9,500,000
Funding target without regard to at-risk assumptions	10,000,000
Funding target using at-risk assumptions	11,750,000
Target normal cost without regard to at-risk assumptions	2,000,000
Target normal cost using at-risk assumptions	2,350,000
Number of participants	750

Shortfall amortization installments as of 1/1/2020:

<u>Year established</u>	<u>Installment</u>	<u>Outstanding balance</u>
2016	\$80,000	\$228,752
2017	55,000	204,776
2018	10,000	45,460
<u>2019</u>	<u>50,000</u>	<u>264,660</u>
Total	\$195,000	\$743,648

**\$X** is the minimum required contribution as of 1/1/2020.

Question 55

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

- (A) Less than \$2,315,000
- (B) \$2,315,000 but less than \$2,415,000
- (C) \$2,415,000 but less than \$2,515,000
- (D) \$2,515,000 but less than \$2,615,000
- (E) \$2,615,000 or more

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Data for Question 56 (3 points)

Type of plan: Multiemployer

Valuation date: 1/1/2020

Actuarial cost method: Frozen initial liability

Valuation interest rate: 6.00%

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

Selected information as of 1/1/2019:

Unfunded accrued liability	\$800,000
Normal cost	50,000

Selected information as of 1/1/2020:

Market value of assets	\$7,500,000
Actuarial value of assets	7,000,000
Present value of future benefits	10,000,000
Present value of expected future compensation	15,000,000
Present value of total compensation for 2020 for all participants	1,000,000

Sole contribution for the 2019 plan year made on 6/1/2019: \$200,000

Question 56

In what range is the normal cost as of 1/1/2020?

- (A) Less than \$135,000
- (B) \$135,000 but less than \$155,000
- (C) \$155,000 but less than \$175,000
- (D) \$175,000 but less than \$195,000
- (E) \$195,000 or more

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Data for Question 57 (1 point)

Type of plan: Multiemployer

The plan is in endangered status for the 2020 plan year.

Consider the following statement:

The initial excise tax on any accumulated funding deficiency for 2020 is 5%.

Question 57

Is the above statement true or false?

- (A) True
- (B) False

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Data for Question 58 (1 point)

Optional form of payment: Lump sum, determined using the applicable mortality table and applicable interest rates.

Assumed form of payment: 100% lump sum

No participants are affected by the IRC section 415 limits.

The plan has never been top-heavy.

Consider the following statement regarding the calculation of the plan's funding target:

The actuary must substitute the applicable mortality table under IRC section 417(e)(3) for the valuation mortality table for the period after benefit commencement.

Question 58

Is the above statement true or false?

- (A) True
- (B) False

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

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