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FALL 1993 EA-2 EXAM SOLUTIONS

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Last Revised 07/30/00 (see next page)

The solutions for the 1993 exam use beginning of year amortization payments in setting up the Minimum Funding Standards Account. These solutions were prepared based on the law as in effect at June 30, 1993.

These solutions have been compared with those produced by other technical actuaries, and they represent my best understanding of the correct way to solve these problems. As usual, it seems easy to get an answer in the correct range as long as you are not actually taking the exam!

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year. If this is less than the result of step one, then you can skip to step four.
3. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standards Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
4. The maximum deductible limit is the greater of (1) and (2), but not greater than (3).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has 100 or more participants, then the final deductible limit will be the UCL.

Revision History:

| | | | |
|----------|--------------------|----|---|
| 07/30/00 | Corrected problem | 10 | (page 1) |
| 07/06/00 | Corrected problem | 02 | (page 2) |
| 09/08/98 | Corrected problem | 33 | (page 2) |
| 09/19/97 | Corrected problems | 11 | (pages 1-2), 25 (page 1), and 33 (page 2) |
| 09/10/97 | Corrected problem | 34 | |
| 11/05/95 | Corrected problem | 15 | (page 1) |
| 09/27/95 | Corrected problem | 10 | (page 1) |
| 07/23/95 | Corrected problems | 4 | (page 1), 8 (page 1), 9 (page 1), |
| | | 18 | (page 1), 24 (page 2), 28 (page 1), |
| | | 29 | (page 1), 31 (page 2), 32 (page 1) |

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Problem 1 - Page 1

With an individual cost method, there are two things to be aware of. One is that the Full Funding Limitation may apply. The other is that you should check for experience gains or losses each year. In this problem, you have a new plan at 01/01/92 with no assets. You do not need to calculate the Full Funding Limitation, since it does not apply.

When you have a change in plan benefits, you calculate the expected UAL based on the old benefit level. This should be compared to the actual UAL on the old benefit level to give the experience G/L. Since you have no retired or terminated vested participants, you can calculate the accrued liability on the \$20 benefit level as a ratio of the accrued liability on the \$40 benefit level:

$$\begin{aligned} 01/01/93 \text{ \$20 AL} &= (20/40) * (600,000) = 300,000 \\ 01/01/93 \text{ plan change base} &= 600,000 - 300,000 = 300,000 \end{aligned}$$

The experience gain is defined as the e UAL minus the UAL. Since the assets consist of the 12/31/92 contribution, this can be calculated as the non-investment G/L, which is the e AL minus the AL:

$$\begin{aligned} eAL_1 &= (1+i)(AL_0 + NC_0) \\ &= 1.08 (220,000 + 30,000) = 270,000 \end{aligned}$$

$$\text{Loss} = 300,000 - 270,000 = 30,000$$

$$\text{amortization for IAL base} = 220,000 \div \ddot{a}_{30|1.08} = 18,094$$

$$\text{amortization for benefit base} = 300,000 \div \ddot{a}_{30|1.08} = 24,674$$

$$\text{amortization for loss base} = 30,000 \div \ddot{a}_{5|1.08} = 6,957$$

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Problem 1 - Page 2

Minimum Funding Standards Account for 1992

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|--------|
| Normal cost | 30,000 | Credit balance | -0- |
| IAL amort | 18,094 | 12/31 contrib | 60,000 |
| Interest | 3,848 | Interest | -0- |
| | <hr/> | | <hr/> |
| | 51,942 | | 60,000 |

The credit balance at 12/31/92 is $60,000 - 51,942 = 8,058$.

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|---------|----------------|---------|
| Normal cost | 65,000 | Credit balance | 8,058 |
| IAL amort | 18,094 | | |
| Loss amort | 6,957 | | |
| Plan chg amort | 24,674 | 12/31 contrib | x |
| 8% interest | 9,178 | 8% interest | 645 |
| | <hr/> | | <hr/> |
| | 123,903 | | x+8,703 |

The minimum contribution at 12/31/91 is $123,903 - 8,703 = 115,201$.

answer is B

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Problem 2 - Page 1

For waivers granted prior to 1988, a 15 year amortization period should be used (use 5 years for waivers after 1987). One of the general conditions of the exam states that the interest rate used to calculate the amortization of a waiver should be based on the valuation interest rate. In this problem you are told to use 14% to amortize the waiver, which should be the value of 150% of the FMR.

The "easy way" solution is to know the formula and to write down the answer. The first step in the "hard way" solution is to set up the MFSA for 1994, which requires calculation of the waiver amortization:

$$\text{Amortization for 43,200 waiver} = 43,200 \div \ddot{a}_{\overline{5}|.14} = 11,038$$

To avoid getting confused, you should convert this to an end of year amortization amount for the MFSA: $1.14(11,038) = 12,583$.

You can calculate the ARA as the difference between the UAL and the outstanding MFSA bases. If there were no waiver, the ARA would be zero. The UAL and the MFSA bases would remain in balance in future years. You only need to analyze the impact of the MFSA amortization at 14% versus the original "waiver layer" of the UAL, which is credited with 8% interest.

Minimum Funding Standards Account for 1994

| <u>Charges</u> | | | <u>Credits</u> | |
|-----------------|-------|--------|-------------------|------|
| Normal cost | 12/31 | NC | Credit balance | -0- |
| Waiver amort | 12/31 | 12,583 | Actual cont 12/31 | CONT |
| 8% interest | | .08*NC | 8% interest | -0- |
| <hr/> | | | <hr/> | |
| (1.08)NC+12,583 | | | CONT | |

$$\begin{aligned} 01/01/95 \text{ } e_{UAL_1} &= (1+i)(UAL_0 + NC_0) - (\text{contrib} + i) \\ &= 1.08 (43,200 + NC) - \text{CONT} \\ &= 46,656 + (1.08)NC - \text{CONT} \end{aligned}$$

$$01/01/95 \text{ } CB = \text{CONT} - (1.08)NC - 12,583$$

$$\begin{aligned} 01/01/95 \text{ } O/S \\ 412 \text{ bases} &= 43,200 * (\ddot{a}_{\overline{4}|.14} \div \ddot{a}_{\overline{5}|.14}) \\ &= 36,665 \end{aligned}$$

$$\begin{aligned} 01/01/95 \text{ } ARA &= O/S \text{ bases} - CB - UAL \\ &= 36,665 - (\text{CONT} - (1.08)NC - 12,583) \\ &\quad - (46,656 + (1.08)NC - \text{CONT}) \\ &= 36,665 + 12,583 - 46,656 = 2,592 \end{aligned}$$

Problem 2 - Page 2

Since the NC and CONT drop out of our calculation, we can make some simplifying assumptions. Assume that the NC is zero, and that CONT equals 12,583. This produces a CB of zero each year. Now we can determine the values of UAL and O/S bases at 01/95, 01/96 and 01/97.

$$01/01/95 \text{ } e\text{UAL}_1 = 1.08 (43,200 + 0) - 12,583 = 34,073$$

$$01/01/95 \text{ O/S} \\ 412 \text{ bases} = 43,200 * (\ddot{a}_{\overline{41}|1.14} \div \ddot{a}_{\overline{51}|1.14}) = 36,665$$

$$01/01/95 \text{ ARA} = \text{O/S bases} - \text{CB} - \text{UAL} \\ = 36,665 - 0 - 34,073 = 2,592 \text{ (matches prior results)}$$

$$01/01/96 \text{ } e\text{UAL}_1 = 1.08 (34,073 + 0) - 12,583 = 24,215$$

$$01/01/97 \text{ } e\text{UAL}_1 = 1.08 (24,215 + 0) - 12,583 = 13,569$$

$$01/01/97 \text{ O/S} \\ 412 \text{ bases} = 43,200 * (\ddot{a}_{\overline{21}|1.14} \div \ddot{a}_{\overline{51}|1.14}) = 20,721$$

$$01/01/97 \text{ ARA} = 20,721 - 0 - 13,569 = 7,152$$

answer is B

The "easy way" solution is to know that the reconciliation account after n years equals

$$43,200(1.14)^n - 12,583 * s_{\overline{n}|1.14} - 43,200(1.08)^n + 12,583 * s_{\overline{n}|1.08}$$

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Problem 3

For plans with employee contributions, you must know the formula for the amount of any asset reversion to the employees upon plan termination. This formula is specified in the PBGC regulations, and OBRA '87 mandates its use:

$$\text{Employee portion} = \text{Residual assets} \times \text{PC2} / (\text{PC2} + \text{PC3} + \text{PC4} + \text{PC5} + \text{PC6})$$

Note that amounts are put in the numerator and denominator for employees who received lump sums or irrevocable commitments in the prior 3 years. This means you must add Smith's values to those for Brown and Green.

You should use the liability values shown as of 12/31/93, which match the assets at 12/31/93. If you use the 12/31/92 values, the total reversion is 50,000 greater, and your answer will be WAY out of the implied range.

You must calculate total values for the various priority categories:

| | Brown | Green | Smith | TOTAL |
|---------|-------|-------|-------|-------|
| PC1 | 20 | -0- | -0- | 20 |
| PC2 | 30 | 25 | 20 | 75 |
| PC3-PC6 | 100 | 75 | 20 | 195 |
| | <hr/> | <hr/> | <hr/> | <hr/> |
| TOTAL | 150 | 100 | 40 | 290 |

$$\text{Total for PC2 through PC6} = 290,000 - 20,000 = 270,000$$

The market value must be adjusted to add back Smith's distribution. The new value is $300,000 + 40,000 = 340,000$. The value of the reversion based on the adjusted market value of assets is $340,000 - 290,000 = 50,000$.

The total employees' share of the reversion is $50,000 \times (75,000 / 270,000)$, which equals 13,889. The employer share is $50,000 - 13,889 = 36,111$.

answer is B

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Revised
07/23/95

Problem 4 - Page 1

There are only a few aspects of this problem that are difficult. In some problems, the hardest thing to get straight is which valuation corresponds to which tax year. Usually you are only given one set of valuation results, which is valued at the correct valuation date.

The deductible limit for the taxable year ending 01/31/93 is based on the valuation for the plan year beginning in that tax year. The 01/01/93 valuation should be used to determine the deductible limit needed for the answer to this problem.

The first step should be to calculate the normal cost plus limit adjustments. The only ten year amortization bases are the initial accrued liability and the 1992 loss:

$$\text{Limit adjustment} = (800,000 + 75,000) \div \ddot{a}_{101.08} = 120,741$$

The deductible limit is the normal cost plus limit adjustments adjusted with interest to the earlier of the end of the plan year, or the end of the tax year. In this problem, you adjust from 01/01/93 to 01/31/93:

$$\begin{aligned} \text{Deductible limit} &= (60,000 + 120,741) * (1 + .08(1/12)) \\ &= 181,946 \end{aligned}$$

Since you have no market value of assets, you can't check the Full Funding Limitation. With the loss and the OBRA FFC base, you should be sure to check that the minimum contribution does not exceed 181,946.

$$\text{IAL amortization} = 800,000 \div \ddot{a}_{301.08} = 65,798$$

$$\text{Loss amortization} = 75,000 \div \ddot{a}_{51.08} = 17,393$$

$$\text{FFC amortization} = 100,000 \div \ddot{a}_{101.08} = 13,799$$

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Problem 4 - Page 2

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|---------|----------------|---------|
| Normal cost | 60,000 | Credit balance | 25,000 |
| IAL amort | 65,798 | | |
| Loss amort | 17,393 | | |
| FFC amort | 13,799 | 07/01 contrib | 181,946 |
| 8% interest | 12,559 | 8% interest | 9,278 |
| | <hr/> | | <hr/> |
| | 169,549 | | 216,224 |

The minimum contribution is $169,549 - 1.08(25,000)$, which does not exceed the previously calculated deductible limit of 181,946. The interest on the credits is calculated as $.08(25,000) + .04(181,946)$.

The credit balance at 12/31/93 is $216,224 - 169,549 = 46,675$.

answer is C

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Problem 5 - Page 1

FIL is an aggregate cost method. You are given the Entry Age Normal valuation results and you can derive the market value of assets, so you should be sure to check the Full Funding Limitation.

The first step is the derivation of the UAL. Use the equation of balance:

$$\begin{aligned}
 \text{UAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \\
 &= 25,000 \text{ FFC} + \ddot{a}_{267.08} * (200,000 \div \ddot{a}_{307.08}) - 10,000 - 0 \\
 &= 25,000 + (\ddot{a}_{267.08} * 16,450) - 10,000 \\
 &= 25,000 + 192,045 - 10,000 = 207,045
 \end{aligned}$$

$$\begin{aligned}
 \text{NC} &= \text{PVNC} \div (\text{PVE}/\text{E}) \\
 \text{PVNC} &= \text{NC} * (\text{PVE}/\text{E}) \\
 &= 25,000 * 10 = 250,000
 \end{aligned}$$

$$\begin{aligned}
 \text{PVNC} &= \text{PVB} - \text{AAV} - \text{UAL} \\
 \text{MVA} &= \text{AAV} \\
 \text{MVA} &= \text{PVB} - \text{PVNC} - \text{UAL} \\
 &= 1,000,000 - 250,000 - 207,045 \\
 &= 542,955
 \end{aligned}$$

$$\text{FFC amortization} = 25,000 \div \ddot{a}_{107.08} = 3,450$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|----------|
| Normal cost | 25,000 | Credit balance | 10,000 |
| IAL amort | 16,450 | | |
| FFC amort | 3,450 | 12/31 contrib | x |
| 8% interest | 3,592 | 8% interest | 800 |
| | 48,491 | | x+10,800 |

You must check the Full Funding Limitation to see if there is a Full Funding Credit at 12/31/93. Since you have no Current Liability information, you must ignore the new FFL.

$$\begin{aligned}
 \text{old FFL} &= 1.08 (\text{EAN AL} + \text{NC} - (\text{lesser MVA, AAV} - \text{CB})) \\
 &= 1.08 (500,000 + 50,000 - (542,955 - 10,000)) \\
 &= 18,408
 \end{aligned}$$

The Full Funding Credit equals the excess of the Accumulated Funding Deficiency (excluding credit balance and employer contribution) over the Full Funding Limitation. This equals $48,491 - 18,408 = 30,083$.

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Problem 5 - Page 2

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|----------|
| Normal cost | 25,000 | Credit balance | 10,000 |
| IAL amort | 16,450 | 12/31 FFC | 30,083 |
| FFC amort | 3,450 | 12/31 contrib | x |
| 8% interest | 3,592 | 8% interest | 800 |
| | <hr/> | | <hr/> |
| | 48,491 | | x+40,883 |

The minimum contribution at 12/31/93 is $48,491 - 40,883 = 7,608$.

answer is A

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Problem 6

The Entry Age Normal cost method is an individual cost method. You must be careful to calculate gains and losses each year. You are told that the Alternative MFSA is not used in 1992. With a zero credit balance at 12/31/92, the employer paid the minimum contribution of 100,000 (equal to the normal cost) at 12/31/92.

The experience loss for 1992 is equal to the UAL minus the e UAL:

$$\begin{aligned} 1993 \text{ UAL} &= 118,000 - 113,000 = 5,000 \\ 1993 \text{ } e\text{UAL} &= 1.07 * (100,000 + 0) - 1.07 (100,000) = 0 \\ \text{Loss} &= 5,000 \end{aligned}$$

Alternative Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|--------------------|--------|----------------|--------|
| 12/31 Normal cost: | | Credit balance | -0- |
| lesser EAN/UC | 90,000 | Contrib 12/31 | 91,000 |
| Excess of UC AL | | 7% interest | -0- |
| over MV assets | 1,000 | | |
| 7% interest | -0- | | |
| | <hr/> | | <hr/> |
| | 91,000 | | 91,000 |

In order to switch back to the regular MFSA for 1994, you must also complete the regular MFSA for 1993:

$$12/31/93 \text{ Loss amortization} = 5,000 \div \ddot{s}_{\overline{5}|.07} = 1,140$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|-------------------|---------|----------------|--------|
| 12/31 Normal cost | 100,000 | Credit balance | -0- |
| Loss amort | 1,140 | Contrib 12/31 | 91,000 |
| 7% interest | -0- | 7% interest | -0- |
| | <hr/> | | <hr/> |
| | 101,140 | | 91,000 |

The debit balance at 12/31/93 in the regular MFSA is $101,140 - 91,000 = 10,140$. When you switch back to the regular MFSA, the definition of the amount of the base is the excess of the debit balance in the regular MFSA over the debit balance in the AMFSA. This produces an AMFSA amortization base of 10,140, as well as a MFSA credit for the same amount.

$$01/01/94 \text{ AMFSA switch-back amortization} = 10,140 \div \ddot{s}_{\overline{5}|.07} = 2,311$$

$$12/31/94 \text{ AMFSA switch-back amortization} = 1.07 * 2,311 = 2,473$$

answer is E

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Problem 7

The provisions of IRC section 411(d)(6) state that you can't remove an accrued benefit from plan participants.

- I. False - This is not a violation, since the plan amendment provides for the enhanced early retirement benefit on a temporary basis for retirements between 01/01/94 and 09/30/94. The amendment does not create an expectation of enhanced early retirement benefits for participants who retire after 09/30/94.
- II. True - This is a violation, since a consistent practice of plan amendments has been established. The amendments have created an expectation of enhanced early retirement benefits for ALL participants.
- III. True - This is a violation, since the plan amendment at 1/1/94 provides the enhanced early retirement benefits for ALL plan participants. The amendment at 10/01/94 eliminates this accrued benefit for participants who do not retire prior to 01/01/95.

answer is C

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Revised
07/23/95

Problem 8

This problem tests your knowledge of the handling of the Current Liability. The 1992 deductible limit was equal to the unfunded Current Liability of 86,000. This amount was contributed at 12/31/92.

The 1993 contribution is also equal to the deductible limit. The first step should be to calculate the normal cost plus limit adjustments. The only ten year amortization base is the initial accrued liability:

$$\text{Limit adjustment} = 200,000 \div \ddot{a}_{\overline{10}|.08} = 27,598$$

The deductible limit is the normal cost plus limit adjustments adjusted with interest to the earlier of the end of the plan year, or the end of the tax year.

$$\begin{aligned} \text{Deductible limit} &= (45,000 + 27,598) * (1.08) \\ &= 78,406 \end{aligned}$$

Since you have no Entry Age Normal valuation results, you can't check the Full Funding Limitation. With no loss bases or FFC bases or waiver bases, the minimum contribution won't increase the deductible limit.

The only trick in the problem is the unfunded Current Liability. You might be tempted to use this, since it applied in 1992. However, that would be incorrect for 1993. The reason is that there are less than 100 participants on each day in 1993. Now you must derive the credit balance at 01/01/93 and at 01/01/94.

$$\text{IAL amortization} = 200,000 \div \ddot{a}_{\overline{30}|.08} = 16,450$$

$$\begin{aligned} 01/01/93 \text{ UAL} &= \text{O/S bases} - \text{CB} - \text{ARA} \\ 184,000 &= (\ddot{a}_{\overline{29}|.08} * 16,450) - \text{CB} - 0 \end{aligned}$$

$$\text{CB} = 198,235 - 184,000 = 14,235$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|--------|
| Normal cost | 45,000 | Credit balance | 14,235 |
| IAL amort | 16,450 | 07/01 contrib | 78,406 |
| 8% interest | 4,916 | 8% interest | 4,275 |
| | <hr/> | | <hr/> |
| | 66,365 | | 96,916 |

The interest on the credits is calculated as $.08(14,235) + .04(78,406)$. The credit balance at 12/31/93 is $96,916 - 66,365 = 30,550$.

answer is B

Problem 9

The MFSA charges should be increased by the Unpredictable Contingent Event amount plus the excess, if any, of the DRC over the MFSA charges and credits specified in Section 412(1). The DRC is defined as the sum of the unfunded old liability amount (UOLA) and the unfunded new liability amount (UNLA). In this problem, you are told there are no unpredictable contingent events.

The UOLA equals the amortization of the remaining portion of the unfunded old liability over a period that was 18 years at 1-1-89. You are given the UOLA as 5,616 in this problem.

The UNLA is defined as the unfunded new liability times the applicable percentage, which is $30\% - 25\%(FCL\% - 35\%)$. In this problem, you must calculate this percentage.

$$\begin{aligned} FCL\% &= (AAV - CB) / CL \\ &= (200,000 - 11,000) \div 300,000 = 63.0\% \end{aligned}$$

$$\begin{aligned} APP\% &= .30 - .25[.630 - .350] \\ &= 23.0\% \end{aligned}$$

The unfunded new liability is the excess of the unfunded current liability over the remaining portion of the unfunded old liability. The unfunded current liability is defined as the excess of the current liability over the actuarial asset value, reduced by the credit balance.

$$\begin{aligned} UCL &= 300,000 - (200,000 - 11,000) \\ &= 111,000 \\ UNL &= 111,000 - 50,000 = 61,000 \\ UNLA &= 61,000 * 23.0\% = 14,030 \\ DRC &= 5,616 + 14,030 = 19,646 \end{aligned}$$

You must subtract the IAL amortization charge and the amortization of the plan amendment under 412(b) from the DRC to calculate the additional 412(1) charge.

$$\begin{aligned} 01/01 \text{ 412(1) charge} &= 19,646 - 5,000 \text{ IAL amort} - 1,000 \text{ plan chg amort} \\ &= 13,646 \end{aligned}$$

Since there are more than 150 plan participants, you do not pro-rate the additional 412(1) charge. The last step is to bring the 412(1) charge forward to the end of the year with interest at the current liability rate.

$$12/31/93 \text{ 412(1) charge} = 1.08(13,646) = 14,738$$

answer is C |

Problem 10 - Page 1

Since the problem states that the DB plan benefit will be reduced if the Section 415 limits are exceeded, you must calculate the DC fraction under Section 415(e)(3) first. The maximum DB plan fraction would then equal one minus the DC fraction.

The DC fraction represents the ratio of the annual additions to a participant's account to the theoretical maximum annual additions. After the passage of TEFRA, the limit on the sum of the DB and DC fractions was changed from 1.40 to 1.00. This change required applying the 1.25 and 1.40 factors in the calculation of the denominator.

If the participant was hired prior to the effective date of the plan, the computation of the DC fraction takes into account years of service back to hire date (see IRC Section 415(e)(3)(B)). The numerator includes annual additions for the years the plan was actually in effect up to retirement. With a DC plan effective date of 01/01/80, this participant has both the numerator and the denominator based on years 1989 through 1993.

In the calculation of the 415(e) DB and DC fractions, the denominator will be affected by the top heavy status of the plan. Since the plan is super top heavy, the dollar limit will be multiplied by 1.00 instead of 1.25.

Calculation of Theoretical Maximum Addition

| Plan Year | Annual | 140% x 25% of | 100% x DC \$ | Lesser of | Annual Addition |
|-----------|----------------|---------------------|-----------------|---------------------|---------------------|
| 12/31/89 | 30,000 | 10,500 | 30,000 | 10,500 | 4,500 |
| 12/31/90 | 40,000 | * | 30,000 | * | 6,000 |
| 12/31/91 | 50,000 | * | 30,000 | * | * |
| 12/31/92 | 60,000 | * | 30,000 | * | * |
| 12/31/93 | 70,000 | 24,500 | 30,000 | 24,500 | 10,500 |
| | <u>250,000</u> | <u>.35(250,000)</u> | | <u>.35(250,000)</u> | <u>.15(250,000)</u> |

* These values don't need to be calculated. The DC fraction numerator values are 15% of pay, and the denominator values are 35% of pay.

$$\text{DC fraction} = .15/.35 = .4286$$

The maximum DB plan fraction equals one minus the DC fraction, or .5714. You can "back into" the projected benefit under the DB plan that will produce the DB fraction of .5714.

You should be wary of a calculation that shows a DB fraction that exceeds 80%. This is not possible, since the largest possible DB fraction under Section 415(e)(2) is $1/1.25 = .8000$, which results from a projected benefit equal to the DB plan dollar maximum. If the 100% FAE3 limit applied, then the DB fraction is $1/1.40 = .7143$.

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Problem 10 - Page 2

Now you must calculate the DB plan fraction in order to determine the maximum projected benefit for valuation purposes. Smith is age 61 at 01/01/93. Smith's total service at retirement is eight years based on the 01/01/89 date of hire. With an effective date of 01/01/92, Smith's participation service under this plan will be five years at retirement. The 415 limits have to be reduced for service (or participation) less than ten years.

Age 61 pay = 70,000

Age 64 pay = 81,034 = 70,000(1.05)³

Age 65 FAE3 = 77,236 = 81,034 * ($\frac{1}{1.05} \div 3$)

Projected plan benefit prior to limitations = 77,236(.85) = 65,651

100% FAE3 Section 415 limit reduced for service = 77,236(8/10) = 61,789

Social Security Retirement Age = 65 since born prior to 1938

Section 415 dollar limit during 1993 = 115,641 at age 65

Section 415 dollar limit reduced for participation = 115,641(5/10) = 57,821

Ignoring the effects of 415(e), Smith's benefit would be limited to the lesser of 65,651 or the lesser of 61,789 and 57,821, which equals 57,821. Under 415(e), the reduction on the dollar limit in the denominator is based on years of service, not years of participation. As mentioned earlier, since the plan is super top heavy, the multiplier is reduced to 1.00.

Section 415 dollar limit reduced for service = 115,641(8/10) = 92,513

PB = final projected benefit

DB fraction = 57.14% = PB ÷ [lesser of 1.00(92,513) or 1.40(61,789)]

PB = 57.14% (lesser of 92,513 or 86,505)
= 49,429

This benefit under 415(e) is lower than the previously calculated 57,821. The final maximum benefit is 49,429.

answer is C

Problem 11 - Page 1

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. Section 4.01 of Revenue Procedure 85-29 specifies that certain bases must be maintained regardless of the funding method that is used. These bases include waivers, shortfall gains and losses, switchback from AMFSA, and transition to satisfy the reasonable funding methods regulation.

The calculation of the normal cost must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

$$\begin{aligned} \text{PV Fut Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - \text{O/S 412 amortization bases} + \text{credit balance} + \text{ARA} \end{aligned}$$

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$. You must determine the new base such that the equation of balance is satisfied. At 12/31/84 under the Aggregate method, there were no O/S 412 bases:

$$01/01/85 \text{ UAL} = \text{method chg base} - \text{CB} = 500,000 - 0$$

The trick to this problem is that the amortization period of the charge base equals the remaining period from when the MFSA was first applicable to this plan. At 01/01/85, the amortization period was 25 years.

$$\begin{aligned} 01/01/93 \text{ UAL} &= 500,000 \left(\ddot{a}_{\overline{17}|.075} / \ddot{a}_{\overline{25}|.075} \right) - 30,000 \\ &= 41,726 * \ddot{a}_{\overline{17}|.075} - 30,000 \\ &= 423,163 - 30,000 = 393,163 \end{aligned}$$

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{UAL} = \text{PVFB} - \text{AAV} - \text{O/S bases} + \text{CB} + \text{ARA} \\ &= 1,000,000 - 400,000 - 393,163 \\ &= 206,837 \\ \text{PVE/E} &= 1,000,000 \div 100,000 = 10.0000 \\ \text{NC} &= 206,837 \div 10.0000 = 20,684 \text{ at } 01/01/93 \end{aligned}$$

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Revised
09/19/97

Problem 11 - Page 2

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|-------------------|----------|
| Normal cost | 20,684 | Credit balance | 30,000 |
| Method chg | 41,726 | Min contrib 12/31 | x |
| 7.5% Interest | 4,681 | 7.5% Interest | 2,250 |
| | <hr/> | | <hr/> |
| | 67,090 | | x+32,250 |

In this problem you can't check the Full Funding Limitation, since you are not given the Entry Age Normal accrued liability. The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$67,090 = 32,250 + x$$

$$x = 34,840$$

answer is E

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Problem 12

Since FIL is an aggregate cost method, you don't have to worry about the possibility of new G/L bases. Since you don't have Entry Age Normal results, you can not check the Full Funding Limitation.

The key to this problem is that you must calculate the deficiency at 12/31/93, and the waiver amortization payment for 1994. You should calculate an end of year amortization payment to be sure that 11.9% interest is charged on the waiver payment.

The only remaining item is the interest charge for late quarterly contributions. This is simply added to the MFSA as an end of year item after all other calculations have been made.

$$\text{IAL amortization} = 500,000 \div \ddot{a}_{30|1.08} = 41,124$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|---------|----------------|-------|
| Normal cost | 55,000 | Credit balance | -0- |
| IAL amort | 41,124 | Contrib 12/31 | -0- |
| 8% Interest | 7,690 | 8% Interest | -0- |
| | <hr/> | | <hr/> |
| | 103,814 | | -0- |

$$01/01/94 \text{ Waiver amortization} = 103,814 \div \ddot{a}_{5|1.119} = 25,673$$

$$12/31/94 \text{ Waiver amortization} = 25,673 * 1.1190 = 28,728$$

Minimum Funding Standards Account for 1994

| <u>Charges</u> | | <u>Credits</u> | |
|--------------------|---------|----------------|-------|
| Normal cost | 50,000 | Credit balance | -0- |
| IAL amort | 41,124 | | |
| 8% Interest | 7,290 | Contrib 12/31 | x |
| 12/31 Waiver amort | 28,728 | | |
| Late qtrly | 1,105 | 8% Interest | -0- |
| | <hr/> | | <hr/> |
| | 128,247 | | x |

The minimum contribution required under IRC Section 412 is 128,247.

answer is E

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Problem 13

This problem tries to trick you on the number of years of service to use in calculating the Top Heavy minimum benefit. Since the plan benefit uses 7 years of service (not participation), and the code refers to "years of service", you might be tempted to use 7 years for the T-H minimum. The plan effective date was 01/01/89, which means there can't be more than 5 T-H years at 12/31/93!

The plan's accrued benefit at 12/31/93 is equal to Smith's 3 year final average earnings times 1.5% times service from the 01/01/87 hire date:

$$\begin{aligned}\text{FAE3} &= (32,000 + 28,000 + 24,000) \div 3 \\ &= 28,000 \\ \text{Plan AB} &= 28,000(.015)(7) \\ &= 2,940\end{aligned}$$

In IRC Section 416, the Top Heavy (T-H) minimum benefit accrual rate is 2%. This must be increased to 3% in order to use the 125% denominator under IRC Section 415(e). This is multiplied by T-H earnings averaged over five years times T-H service (up to a maximum of ten years). The plan has been T-H since 01/01/89, so the T-H minimum will be based on five years of T-H service at 12/31/93:

$$\begin{aligned}\text{FAE5} &= (32,000 + 28,000 + 24,000 + 22,000 + 20,000) \div 5 \\ &= 25,200 \\ \text{T-H min} &= 25,200(.03)(5) \\ &= 3,780\end{aligned}$$

Since this employee is not highly compensated, it really isn't necessary to check the 415 limits:

$$\begin{aligned}415(b)(1)(A) \text{ dollar limit} &= 115,641 * (5/10) = 57,821 \\ 415(b)(1)(B) \text{ FAE3 limit} &= 28,000 * (7/10) = 19,600\end{aligned}$$

The 415 limits do not apply, so the final accrued benefit is 3,780.

answer is D

If you wanted to look at 415(e), the DB fraction must be limited to .80, not $1.00 - .10 = .90$. As long as the 1.25 denominator is used under 415(e) the largest possible DB fraction under Section 415(e)(2) is $1/1.25 = .8000$, which results from a projected benefit equal to the DB plan dollar maximum. If the 100% FAE3 limit applied, then the DB fraction is $1/1.40 = .7143$.

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Problem 14

Since EAN is an individual cost method, you should be wary of both the Full Funding Limitation, and the possibility of new G/L bases. In this problem you can not check the Full Funding Limitation, since you are not given the market value of assets. You are told that no gains or losses have occurred, other than the 1990 gain of 5,000.

The key to this problem is knowledge of how the accumulated reconciliation account (ARA) enters into the theoretical balance equation:

$$UAL = O/S \text{ 412 bases} - CB - ARA$$

$$OSB = IAL \left(\frac{\text{ä}_{261.08}}{\text{ä}_{301.08}} \right) - 5,000 \left(\frac{\text{ä}_{31.08}}{\text{ä}_{51.08}} \right)$$

$$= \text{ä}_{261.08} \left(\frac{IAL}{\text{ä}_{301.08}} \right) - \text{ä}_{31.08} \left(\frac{5,000}{\text{ä}_{51.08}} \right)$$

$$\begin{aligned} 20,000 &= OSB - 2,000 - 1,000 \\ &= 11.6748 \text{ (IAL amort)} - 2.7833(1,160) - 2,000 - 1,000 \end{aligned}$$

$$\begin{aligned} IAL \text{ amort} &= (20,000 + 3,227 + 3,000) \div 11.6748 \\ &= 2,246 \end{aligned}$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|---------|
| Normal cost | 15,000 | Credit balance | 2,000 |
| IAL amort | 2,246 | Gain amort | 1,160 |
| | | Contrib 01/01 | x |
| NO Interest | -0- | NO interest | -0- |
| | <hr/> | | <hr/> |
| | 17,246 | | x+3,160 |

The minimum contribution required at 01/01/93 is $17,246 - 3,160 = 14,087$. The use of a beginning of year contribution is a "cheap trick".

answer is C

Problem 15 - Page 1

With an individual cost method, there are two things to be aware of. One is that the Full Funding Limitation may apply. The other is that you should check for experience gains or losses each year. You are told that there was only an experience gain in 1991. This problem tests your knowledge of the handling of the Current Liability in the Full Funding Limitation under IRC Section 404.

The first step is to calculate the normal cost plus limit adjustments. You can set up a combined ten year amortization base for both the initial accrued liability and the gain base. You must derive the IAL using the equation of balance:

$$\begin{aligned} 01/01/93 \text{ UAL} &= \text{O/S bases} - \text{CB} - \text{ARA} \\ 345,000 &= \text{O/S bases} - 2,000 - 0 \end{aligned}$$

$$\begin{aligned} \text{O/S Bases} &= \text{IAL} \left(\ddot{s}_{\overline{26}|.08} \div \ddot{s}_{\overline{30}|.08} \right) - 7,000 \left(\ddot{s}_{\overline{4}|.08} \div \ddot{s}_{\overline{5}|.08} \right) \\ &= \text{IAL} * .9602 - 5,807 \end{aligned}$$

$$\text{UAL} = 345,000 = \text{IAL} * .9602 - 5,807 - 2,000$$

$$\text{IAL} = 352,807 \div .9602 = 367,422$$

$$\text{Limit adjustment} = (367,422 - 7,000) \div \ddot{s}_{\overline{10}|.08} = 49,735$$

The deductible limit is the normal cost plus limit adjustments adjusted with interest to the earlier of the end of the plan year, or the end of the tax year.

$$\begin{aligned} \text{Deductible limit} &= (25,000 + 49,735) * (1.08) \\ &= 80,714 \end{aligned}$$

The second step is to check the Full Funding Limitation under 404. Neither of the FFL values apply:

$$\begin{aligned} \text{Old 404 FFL} &= 1.08 * (25,000 + 500,000 - 155,000) = 399,600 \\ \text{New 404 FFL} &= 1.50 * (250,000) - 1.08 * (155,000) - 0 = 207,600 \end{aligned}$$

The third step is to check the 412 minimum. With no loss bases or FFC bases or waiver bases, the minimum contribution won't increase the deductible limit. The deductible limit at this point is still 80,714.

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Problem 15 - Page 2

The last step is to check the unfunded Current Liability. This is available as a floor to the deductible limit because there are more than 100 participants on each day in 1993. You must bring the assets forward to the end of the year to calculate the UCL at 12/31/93. One thing to be careful of is that you use the valuation interest rate of 8.0% to do this:

$$\begin{aligned} \text{UCL} &= 250,000 - 1.08 * (155,000) \\ &= 82,600 \end{aligned}$$

answer is B

If you use 7.5% to bring the assets forward, the UCL is 83,375. This answer is in range C, which is the wrong answer!

In general, the assets are always adjusted with interest at the valuation rate. Only the Current Liability and its components would be calculated at (or adjusted based on) the current liability interest rate.

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Problem 16 - Page 1

Since the problem states that the DC plan benefit will be reduced if the Section 415 limits are exceeded, you must calculate the DB fraction under Section 415(e)(3) first. The maximum DC plan fraction would then equal one minus the DC fraction.

Defined Benefit Plan

You must calculate the DB plan fraction in order to determine the maximum projected benefit for valuation purposes. Smith is age 58 at 01/01/93. Smith's total service at retirement is ten years based on the 01/01/90 date of hire. With an effective date of 01/01/90, Smith's participation service under this plan will be ten years at retirement. The 415 limits do not have to be reduced since both Smith's total service and participation service at retirement are not less than ten years.

Age 58 pay = 150,000 = 401(a)(17) compensation limit
Age 65 FAE3 = 150,000

Projected plan benefit prior to limitations = 150,000(1.0) = 150,000

100% FAE3 Section 415 limit reduced for service = 150,000

Social Security Retirement Age = 65 since born prior to 1938
Section 415 dollar limit during 1993 = 115,641 at age 65
Section 415 dollar limit reduced for participation = 115,641

Ignoring the effects of 415(e), Smith's DB plan benefit is limited to 115,641. Under 415(e), the reduction on the dollar limit in the denominator is based on years of service, not years of participation. As mentioned earlier, since Smith has ten years of service, the benefit limits are not reduced.

DB fraction = (Proj Ben) ÷ [lesser of 1.25(\$ limit) or 1.40(100% comp3)]
DB fraction = 115,641 ÷ [lesser of 1.25(115,641) or 1.40(150,000)]
= 1 ÷ 1.25 = .80

Defined Contribution Plan

The maximum DC plan fraction equals one minus the DB fraction, or .20. You can "back into" the annual addition under the DC plan that will produce the DC fraction of .20 at 12/31/93.

The DC fraction represents the ratio of the annual additions to a participant's account to the theoretical maximum annual additions. After the passage of TEFRA, the limit on the sum of the DB and DC fractions was changed from 1.40 to 1.00. This change required applying the 1.25 and 1.40 factors in the calculation of the denominator.

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Problem 16 - Page 2

Since the participant was hired prior to the effective date of the plan, the computation of the DC fraction takes into account years of service back to hire date (see IRC Section 415(e)(3)(B)). The numerator includes annual additions for the years the plan was actually in effect up to retirement. This participant has the denominator based on years 1990 through 1993.

Calculation of Theoretical Maximum Addition

| Plan Year Ending | Annual Comp | 140% * 25% of Comp | 125% * DC \$ limit | Lesser of 1.25, 1.40 | Annual Addition 9% pay |
|---------------------|----------------|--------------------------|--------------------------|-------------------------|------------------------------|
| 12/31/90 | 40,000 | 14,000 | 37,500 | 14,000 | -0- |
| 12/31/91 | 100,000 | 35,000 | 37,500 | 35,000 | 9,000 |
| 12/31/92 | 110,000 | 38,500 | 37,500 | 37,500 | 9,900 |
| 12/31/93 | 150,000 | 52,500 | 37,500 | 37,500 | X |
| | | | | <u>124,000</u> | <u>X+18,900</u> |

$$\begin{aligned}
 \text{DC fraction} &= (X + 18,900) \div 124,000 \\
 &= .20 \\
 X &= (.20 * 124,000) - 18,900 \\
 &= 5,900
 \end{aligned}$$

answer is D

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Problem 17

Section 404(a)(7)(A) of the IRC states the deductible limitation for combinations of DB and DC plans. The limit is the greater of 25% of compensation, or the amount paid to the DB plans, not to exceed the minimum contribution requirement of the DB plans required under Section 412. Section 4972 of the IRC imposes a 10% excise tax on contributions exceeding the deductible limitation.

For a plan funded under the FIL method with a zero credit balance, the minimum required contribution at the end of the year is the normal cost calculated payable at the end of the year plus the 30 year amortization of the IAL:

$$1.08 (300,000 + 1,800,000 \div \bar{s}_{\overline{30}|1.08}) = 483,889$$

The deduction limitation is 483,889, which is the greater of $25\%(1,700,000) = 425,000$, and the portion of the DB contribution required to satisfy the 412 minimum.

The total contribution paid for the year is 560,000, which equals 550,000 for the DB plan plus 10,000 for the 401(k) plan. Note that the employee pre-tax elective contributions are counted as employer contributions. The contribution subject to excise tax is the excess of 560,000 over the deductible limit of 483,889, or 76,111. The excise tax is 10% of this amount, which is 7,611.

answer is B

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Revised
07/23/95

Problem 18

This is typical Section 415 benefit calculation problem. The first step is to calculate the basic plan benefits. Next, the 415 limits must be applied. Since the participants were born before 1938, the limits for a Social Security Retirement Age of 65 are used.

The overall 415 limit is defined as the lesser of 115,641 or 100% of three consecutive year high compensation. The application of the 415 limits can not reduce the benefit below 10,000. The dollar maximum must be reduced pro-rata for less than 10 years of participation service. The other two limits would be reduced pro-rata for less than 10 years of service from hire.

These participants have 6 years of service at 01/01/94. Since the plan was set up at 01/01/89, these participants have 5 years of participation service at 01/01/94.

| | Smith | Brown | |
|--|---------|-----------|----------|
| Compensation since participation | 51,000 | 1,000,000 | |
| 10% times total compensation | 5,100 | 100,000 | |
| Years of participation | 5 | 5 | |
| \$1,440 * partic svc | 7,200 | 7,200 | |
| Plan accrued benefit, greater of above | 7,200 | 100,000 | |
| Years of service | 6 | 6 | |
| 10,000 floor | 10,000 | 10,000 | |
| Pro-rate for years of service < 10 | 6,000 | 6,000 | |
| 100% 3 yr comp | 11,000 | 200,000 | |
| Pro-rate for years of service < 10 | 6,600 | 120,000 | |
| Dollar maximum | 115,641 | 115,641 | |
| Pro-rate for years of participation < 10 | 57,821 | 57,821 | |
| Final 415 limit - Greater of 415 floor and Lesser of (dollar or FAE3 maximums) | 6,600 | 57,821 | |
| Lesser of plan ben and 415 limit | 6,600 | 57,821 | Σ=64,421 |

This is a deceptive problem, since you might want to skip the detailed calculations for Smith. But that would give you the wrong answer.

answer is B

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Problem 19

IRC Section 414(1)(2) contains provisions for allocating assets to spun off plans when the assets exceed the present value of accrued benefits on a termination basis, and when the spun off plans are members of the same controlled group. You must allocate the "applicable percentage" of the "excess assets" to each spun off plan.

The "excess assets" equal the excess of the market value of assets over the present value of accrued benefits on a termination basis. In this problem, the excess assets equal $2,600,000 - 1,600,000 = 1,000,000$.

The "applicable percentage" is the ratio for a spun off plan to the total for the original plan of the excess, if any, of (I) the lesser of 150% of Current Liability or (normal cost plus accrued liability), over (II) the present value of accrued benefits on a termination basis.

| | Total | | |
|-----------------------------------|---------------|---------------|---------------|
| | <u>Plan A</u> | <u>Plan B</u> | <u>Plan C</u> |
| (1) Liability component of FFL | 2,100,000 | 1,200,000 | 900,000 |
| (2) PV of AB on termination basis | 1,600,000 | 1,000,000 | 600,000 |
| (3) Excess of (1) over (2) | 500,000 | 200,000 | 300,000 |
| (4) Applicable percentage | 100% | 40% | 60% |
| (5) Allocated excess assets | 1,000,000 | 400,000 | 600,000 |
| (6) Total alloc assets (2)+(5) | 2,600,000 | 1,400,000 | 1,200,000 |

answer is C

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Problem 20

Section 411(c)(2) of the IRC defines the calculation of the employee provided accrued benefit. After the passage of OBRA '89, the 417(e) graded rates are used to accumulate the employee contributions plus interest (EECWI) from the determination date to normal retirement age. The resulting EECWI is converted to an annual annuity by dividing by an annuity at the immediate interest rate. For a normal form other than a life annuity, factors in Revenue Ruling 76-47 were used to adjust the resulting benefit.

The first step is to calculate the total accrued benefit at termination:

$$\begin{aligned}\text{Accrued benefit} &= 1.5\% * (4 \text{ years}) * (50,000 + 50,000 + 50,000) \div 3 \\ &= 3,000\end{aligned}$$

The next step is to calculate each year's employee contributions, and then the amount of the employee provided accrued benefit:

| AS OF | 3% EEC | EECWI |
|----------|--------|-------------------------------|
| 12/31/89 | 1,500 | 1,500 |
| 12/31/90 | 1,500 | 3,144 = 1,500(1.0957) + 1,500 |
| 12/31/91 | 1,500 | 4,951 = 3,144(1.0978) + 1,500 |
| 12/31/92 | 1,500 | 6,852 = 4,951(1.0810) + 1,500 |

Smith is age 28 at 01/01/93, and you have to convert the contribution balance to a benefit at age 65, which is 37 years later. The EECWI must be accumulated with interest at the first deferred rate for 7 years, interest at the second deferred rate for 8 years, and interest at the third deferred rate for 22 years:

$$\begin{aligned}\text{EECWI at 65} &= 6,852 * (1.05)^7 * (1.04)^8 * (1.04)^{22} \\ &= 31,271\end{aligned}$$

The employee provided annual accrued benefit at age 65 is calculated by dividing by the annuity value at the immediate interest rate:

$$31,271 \div 9.51 = 3,288$$

Since the employee provided accrued benefit exceeds the total accrued benefit, the total accrued benefit equals the employee provided accrued benefit of 3,288.

answer is C

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Problem 21

To calculate the required quarterly contribution for 1993, you must first calculate the required annual payment (RAP). This is the lesser of last year's minimum required contribution or 90% of this year's. These numbers are both interest adjusted to the first day of this plan year, and they both would not reflect any credit balance.

$$\begin{aligned} 12/31/92 \text{ "minimum requirement"} &= 1.08 (100,000 + 35,000) \\ &= 145,800 \end{aligned}$$

$$\begin{aligned} 01/01/93 \text{ "minimum requirement"} &= 130,000 + 40,000 \\ &= 170,000 \end{aligned}$$

$$\text{RAP} = \text{lesser of 1992 or 90\% of 1993} = 145,800$$

The required quarterly installment is based on the applicable percentage multiplied by the RAP. This equals $.25(145,800) = 36,450$.

You may take credit for any credit balance at 01/01/93 as if it was a payment toward the required quarterly installment. This is only true if the contribution that creates the credit balance is actually in the trust fund at 01/01/93. You should set up the MFSA for 1992 to calculate the credit balance at 01/01/93.

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|---------|----------------|---------|
| Normal cost | 100,000 | Credit balance | 8,000 |
| IAL amort | 35,000 | Contributions | 155,000 |
| 8% Interest | 10,800 | 8% Interest | 3,940 |
| | <hr/> | | <hr/> |
| | 145,800 | | 166,940 |

The interest is calculated as $8,000 * (.08) + 30,000 [(8.5/12) * (.08) + (5.5/12) * (.08) + (2.5/12) * (.08)] = 640 + 3,300$.

The credit balance is $166,940 - 145,800 = 21,140$. You can not use the credit balance towards payment of the required quarterly contribution at 04/15/93. The reason is that the 35,000 contribution that creates the credit balance is not paid into the trust until 06/15/93. At 04/15/93, the contribution to avoid a late quarterly contribution penalty is 36,450.

answer is B

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Problem 22

This is a multiemployer PBGC guaranteed benefits question. In general, benefit increases within the 60 months preceding DOPT are not guaranteed. For a multiemployer plan that is "underfunded", the PBGC guarantees a \$5 per month benefit accrual rate plus 65% of the next \$15 per month of benefit accrual.

Since this plan has always paid the normal cost plus interest on the UAL, it presumably is not underfunded. For a multiemployer plan that is not "underfunded", the PBGC guarantees a \$5 per month benefit accrual rate plus 75% of the next \$15 per month of benefit accrual.

For this plan, that produces a guaranteed benefit based on the plan at 01/01/80, since that was the plan in effect five years before DOPT:

$$5.00 + 75\%(15.00) = 16.25 \text{ per month}$$

| (1) | (2) | (3) | (4) | (5) = (1) * (2) * (3) * (4) |
|---|-----------------------------------|-------------------------------|------------------------------|--|
| <u>Number of</u> <u>Participants</u> | <u>Years of</u> <u>Service</u> | <u>Benefit</u> <u>Rate</u> | <u>P.V.</u> <u>Factor</u> | <u>P.V. of</u> <u>Guaranteed</u> <u>Benefits</u> |
| 8 | 20 | 16.25 | 30.00 | 78,000 |

answer is C

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Problem 23

Revenue Ruling 81-212 contains acceptable methods used to allocate Minimum Funding Standards Account items when a plan is spun off into two or more plans. This problem tests the method used to allocate the outstanding amortization bases upon spinoff. Revenue Ruling 86-47 contains different rules which must be used when the market value of assets exceeds the present value of benefits on a termination basis (before the plan is spun off), and when one of the spun off plans has a zero UAL.

The method of allocation is based on the fact that, for a plan with a non-zero UAL, the outstanding 412 amortization bases less the credit balance equals the UAL. At the date of spinoff, the present value of benefits on a termination basis is used to allocate the market value of assets to the spun off plans. The Accrued Liability under the cost method is calculated for each of the plans. In this problem, you are given the allocated credit balance, and you must allocate the O/S 412 bases between the plans.

Under the FIL method, the UAL is written down each year based on the formula for the expected UAL. At plan spinoff, the Entry Age Normal accrued liability is used to develop an allocation weight. This takes the accumulated experiences gains and losses of the spun off populations into account. The EAN AL is used to allocate the sum of the UAL and AAV, which is termed the "FIL accrued liability" in the revenue ruling. The market value of assets is used to allocate the AAV between the two plans. The difference between the allocated "FIL AL" and the allocated AAV is the allocated UAL. The O/S 412 amortization bases must equal the sum of the allocated UAL and the allocated credit balance.

$$\begin{aligned}\text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= 360,000 - 30,000 \\ &= 330,000\end{aligned}$$

$$\begin{aligned}\text{"FIL AL"} &= \text{UAL} + \text{AAV} \\ &= 330,000 + 150,000 \\ &= 480,000\end{aligned}$$

| | | <u>Plan A</u> | <u>Plan B</u> | <u>Plan B</u> |
|------------------|---------------|---------------|---------------|---------------|
| Given | (A) EAN AL | 300,000 | 195,000 | 105,000 |
| Allocated by (A) | (B) FIL AL | 480,000 | 312,000 | 168,000 |
| Given | (C) MVA | 125,000 | 75,000 | 50,000 |
| Allocated by (C) | (D) AAV | 150,000 | 90,000 | 60,000 |
| (B) - (D) | (E) UAL | 330,000 | 222,000 | 108,000 |
| Given | (F) CB | 30,000 | 18,000 | 12,000 |
| (E) + (F) | (G) O/S bases | 360,000 | 240,000 | 120,000 |

answer is C

The calculations for Plan C are not strictly necessary, but they do allow you to check that the figures add to the correct total.

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Problem 24 - Page 1

This is a typical Section 415 benefit calculation problem. The first step is to calculate the basic plan benefits. Next, the 415 limits must be applied. Since this participant was born between 1938 and 1954, the limits for a Social Security Retirement Age of 66 are used.

The overall 415 limit is defined as the lesser of 115,641 or 100% of 3 year FAE. The application of the 415 limits can not reduce the benefit below 10,000. The dollar maximum must be reduced pro-rata for less than 10 years of participation service. The other two limits would be reduced pro-rata for less than 10 years of service from hire.

The plan was set up at 01/01/92, and Smith was hired at 01/01/91. Smith was born 01/01/40 and attains age 60 on 01/01/00. Smith has nine years of total service and eight years of participation service upon retirement at 01/01/01. Both limits will be reduced upon retirement.

The reductions specified in Section 415 are $6\frac{2}{3}\%$ per year for the first three years prior to SSRA, and 5% per year thereafter. Starting at age 62, an actuarial reduction must be used, based on the greater of the interest rate in the plan or 5%. The definition of the actuarial reduction depends on the risk of forfeiture. Notice 87-21: A-5 states "the mortality decrement may be ignored to the extent that a forfeiture does not occur at death".

If a plan has a pre-retirement death benefit equal to the lump sum value of the participant's accrued benefit, then it is 100% true that a forfeiture does not occur at death. In this case, you can ignore 100% of the mortality decrement. For this plan, which has no pre-retirement death benefit, it is 0% true that a forfeiture does not occur at death, and you must use the ratio of the N_x factors to calculate the actuarial reduction in the 415 limits prior to age 62.

The resulting limitation at age 62 is

$$115,641 (1 - 3(.06667) - .05) = 115,641(.75) = 86,731$$

The resulting limitation at age 60 is

$$86,731 * N_{62}^{(12)} \div N_{60}^{(12)} = 86,731 * 232 \div 281 = 71,607$$

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Problem 24 - Page 2

Now calculate the plan retirement benefit at retirement age 60. Note that the projected pay values are less than the 401(a)(17) limit of 235,840 for 1993.

| | |
|-------------------------------|-------------------------------|
| Age 52 pay | 160,000 |
| Projected age 59 pay | $210,549 = 160,000 (1.04)^7$ |
| Projected age 58 pay | $202,451 = 160,000 (1.04)^6$ |
| Projected age 57 pay | $194,664 = 160,000 (1.04)^5$ |
| Projected FAE3 at 60 | $202,555 = 607,664 \div 3$ |
| plan retirement benefit at 60 | $63,805 = 202,555 * .035 * 9$ |
| 100% 3 yr FAE 415 maximum | $182,299 = 202,555 * (9/10)$ |
| 415 dollar maximum at 60 | $57,286 = 71,607 * (8/10)$ |

Final benefit is lesser of 415 limits and plan benefit = 57,286

answer is B

Problem 25 - Page 1

Since Entry Age Normal is an individual cost method, you should check to see if an experience G/L occurred in 1992. Since you are also given actuarial and market values of assets, you should look at the Full Funding Limitation.

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. Section 4.01 of Revenue Procedure 85-29 specifies that certain bases must be maintained regardless of the funding method that is used. These bases include waivers, shortfall gains and losses, switchback from AMFSA, and transition to satisfy the reasonable funding methods regulation.

The calculation of the normal cost must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

$$\begin{aligned} \text{PV Fut Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - \text{O/S 412 amortization bases} + \text{credit balance} + \text{ARA} \end{aligned}$$

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$. You must determine the new base such that the equation of balance is satisfied.

First you must determine the actual and expected UAL at both 01/01/92 and 01/01/93 under the old asset valuation method.

$$\begin{aligned} 01/01/92 \text{ 5 yr avg MVA} &= 300,000 \\ 20\% \text{ corridor of MVA} &= 260,000 * (.8) \text{ to } 260,000 * (1.2) \\ &= 208,000 \text{ to } 312,000 \\ \text{Final AAV} &= 300,000 \\ 01/01/92 \text{ UAL} &= 100,000 = 400,000 - 300,000 \end{aligned}$$

$$\begin{aligned} 01/01/93 \text{ 5 yr avg MVA} &= 380,000 \\ 20\% \text{ corridor of MVA} &= 320,000 * (.8) \text{ to } 320,000 * (1.2) \\ &= 256,000 \text{ to } 384,000 \\ \text{Final AAV} &= 380,000 \\ 01/01/93 \text{ UAL} &= 120,000 = 500,000 - 380,000 \end{aligned}$$

Now you can calculate the expected UAL and the experience G/L. The contribution of 60,000 paid at 01/01/92 equals the normal cost plus MFSA amortization payment at 01/01/92. This contribution results in a zero credit balance at 01/01/93.

$$\begin{aligned} 01/01/93 \text{ } e\text{UAL}_1 &= (1+i)(\text{UAL}_0 + \text{NC}_0) - (\text{contrib} + i) \\ &= 1.08 (50,000 + 100,000) - 1.08(60,000) \\ &= 97,200 \end{aligned}$$

$$\text{Experience loss} = 22,800 = 120,000 \text{ actual} - 97,200 \text{ expected}$$

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Problem 25 - Page 2

Now you can determine the effect of the change in asset valuation method. The new AAV is the market value of 320,000. This produces a UAL of 180,000, which is an increase of 60,000 at 01/01/93. This is the new charge base for the change in asset valuation method.

The amortization period of the charge base equals the remaining period from when the MFSA was first applicable to this plan (01/01/85). At 01/01/93, the remaining amortization period is 22 years.

$$\text{Loss amortization} = 22,800 \div \ddot{a}_{\overline{22}|.08} = 5,287$$

$$\text{Method amortization} = 60,000 \div \ddot{a}_{\overline{22}|.08} = 5,446$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|-------------------|-------|
| Normal cost | 63,000 | Credit balance | -0- |
| Net amort | 10,000 | | |
| Loss amort | 5,287 | | |
| Method amort | 5,446 | Min contrib 12/31 | x |
| 8% Interest | 6,699 | 8% Interest | -0- |
| | <hr/> | | <hr/> |
| | 90,432 | | x |

$$\begin{aligned} \text{old FFL} &= 1.08 (\text{EAN AL} + \text{NC} - (\text{lesser MVA, AAV} - \text{CB})) \\ &= 1.08 (500,000 + 63,000 - (320,000 - 0)) \\ &= 262,440 \end{aligned}$$

The Full Funding Limitation does not come into play. The minimum contribution is 90,432.

answer is D

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Problem 26 - Page 1

Projected unit credit is an individual cost method. You should be sure to check for any experience G/L during 1992.

There is one main point to this problem - you don't have to calculate any late interest penalties for quarterly contributions in the first plan year that is subject to the MFSA. When you see that the 1992 contribution was paid at 12/31/92, you might be tempted to do just that!

To calculate the required quarterly contribution for 1993, you must first calculate the required annual payment (RAP). This is the lesser of last year's minimum required contribution or 90% of this year's. These numbers are both interest adjusted to the first day of this plan year, and they both would not reflect any credit balance.

The first step of the problem is to set up the 1992 MFSA. This allows you to calculate the credit balance at 12/31/92, which can be used towards the 04/15/93 required installment.

$$\text{IAL amortization} = 450,000 \div \ddot{a}_{30|1.08} = 37,011$$

Minimum Funding Standards Account for 1992

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|---------|
| Normal cost | 50,000 | Credit balance | -0- |
| IAL amort | 37,011 | 12/31 Contrib | 100,000 |
| 8% Interest | 6,961 | 8% Interest | -0- |
| | 93,972 | | 100,000 |

The credit balance is $100,000 - 93,972 = 6,028$.

The second step of the problem is to calculate the expected AL and the experience G/L at 01/01/93. You can simply calculate the non-investment G/L because the only asset is the 12/31/92 contribution.

$$\begin{aligned}
 01/01/93 \text{ } {}_eAL_1 &= (1+i)(AL_0 + NC_0) \\
 &= 1.08 (50,000 + 450,000) \\
 &= 540,000
 \end{aligned}$$

$$\text{Experience loss} = 10,000 = 550,000 \text{ actual} - 540,000 \text{ expected}$$

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Problem 26 - Page 2

Now you can calculate the loss amortization payment and the required annual payment:

$$\text{Loss amortization} = 10,000 \div 4.5108 = 2,319$$

$$12/31/92 \text{ "minimum requirement"} = 93,972 = 1.08 (50,000 + 37,011)$$

$$01/01/93 \text{ "minimum requirement"} = 99,330 = 60,000 + 37,011 + 2,319$$

$$\text{RAP} = \text{lesser of 1992 or 90\% of 1993} = 89,397$$

The required quarterly installment is based on the applicable percentage multiplied by the RAP. This equals $.25(89,397) = 22,349$.

You can take credit for the credit balance at 01/01/93 as if it was a payment toward the required quarterly contribution. The reason is that the contribution that creates the credit balance is actually in the trust fund at 04/15/93.

| <u>DATE</u> | <u>REQ'D QTRLY</u> | <u>Amount Available</u> | <u>Overpayment (Underpayment)</u> |
|-------------|------------------------|---|---------------------------------------|
| 04/15/93 | 22,349 | 6,028 (1.08) ^{3.5/12} = 6,165 | 16,184 |

answer is B

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Problem 27

This problem tests one of the basic concepts of IRC Section 401(l), which is that the maximum excess allowance can't exceed .75% per year of service upon retirement at SSRA. The .75% is reduced for different retirement ages and values of SSRA. The reduced values are shown in tables in the code, which are given in the problem.

Let ERF be an early retirement reduction factor. You must determine the value of X such that

$$X * [\text{plan ERF}] < .75\% * [\text{401(l) ERF}]$$

$$X < .75\% * [\text{401(l) ERF}] \div [\text{plan ERF}]$$

The worst case is for participants with SSRA = 67, which would correspond to participants who are under age 40 today (DOB > 1954).

| RET Age | SSRA 67 .75% * 401(l) ERF | Plan ERF | Ratio 401(l) table ÷ Plan ERF |
|------------|---------------------------------|-------------|-------------------------------------|
| 67 | .750 | 1.00 | .7500 |
| 66 | .700 | 1.00 | .7000 |
| 65 | .650 | 1.00 | .6500 |
| 64 | .600 | .95 | .6316 |
| 63 | .550 | .90 | .6111 |
| 62 | .500 | .85 | .5882 <== smallest ratio |
| 61 | .475 | .80 | .5938 |
| 60 | .450 | .75 | .6000 |
| 59 | .425 | .70 | .6071 |
| 58 | .400 | .65 | .6154 |

Since X must be less than the ratio, the greatest value which satisfies the requirements of Section 401(l) for retirement ages 58 to 67 is .5882.

answer is C

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Revised
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Problem 28

This problem tests one of the basic concepts of IRC Section 401(h), which is that the contribution for medical benefits or life insurance can not exceed 25% of the total contribution to the plan (other than to fund past service credits) after the date such plan is established.

Excluding the medical benefits, the limit adjustment is calculated as

$$2,000,000 \div \frac{1}{1.08} = 275,981$$

$$\begin{aligned}\text{Deductible limit} &= 1.08 (750,000 + 275,981) \\ &= 1,108,059\end{aligned}$$

Let the allowable contribution for medical benefits be "L". Since the normal cost for the pension plan is 750,000, the limit under 401(h) means

$$\begin{aligned}L \div (750,000 + L) &= 25\% \\ L &= (750,000 + L) * 25\% \\ &= .25 * (750,000) + .25L \\ &= .25 * (750,000) \div .75 \\ &= 250,000\end{aligned}$$

Including the medical benefits, the deductible limit is calculated as

$$1.08 (750,000 + 250,000 + 275,981) = 1,378,059$$

answer is A

An incorrect interpretation of the limit under 401(h) is that

$$L = .25 * 750,000 = 187,500$$

This produces a deductible limit of 1,310,559, which still falls within the implied range for answer A. The reason for calculating "L" the way we did was the phrase "25% of the total contribution to the plan ... after the date such plan is established."

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Problem 29

Under the Projected unit credit method, the normal cost and accrued liability are defined based on the "funding accrued benefit" (FAB). The FAB is determined as the projected benefit multiplied by a ratio. The ratio is (past service)/(total service), where the years of service are weighted based on rates of benefit accrual.

The plan's FAB at 01/01/93 is equal to Smith's career average earnings times 1.25% times service from the 01/01/82 hire date:

01/01/82 Hire date
01/01/93 Age 56 11 years past service
 20 years total service

Age 55 pay = 30,000

Age 64 pay = 46,540 = 30,000 * (1.05)⁹

Career avg earnings = 30,449 = 46,540 * $\ddot{a}_{20|1.05} \div 20$

Projected plan benefit = 30,449(.0125)(20)
= 7,612

Plan FAB = 7,612 * $\frac{(11 * .0125)}{(20 * .0125)}$
= 4,187

In IRC Section 416, the Top Heavy minimum benefit is defined as 2% times Top Heavy (T-H) earnings averaged over five years times T-H service (up to a maximum of ten years). The plan has been T-H since 01/01/88, so the accrued T-H minimum will be based on five years of T-H service at 01/01/93.

Projected FAE5 = 42,314 = 46,540 * $\ddot{a}_{5|1.05} \div 5$

Projected T-H benefit = 42,314(.02)(10) = 8,463
T-H FAB = 8,463 * $\frac{(5 * .02)}{(10 * .02)}$
= 4,231

The final FAB at 01/01/93 is the greater of the plan FAB or the T-H FAB. The accrued liability is the present value of the final FAB:

Final FAB = greater of 4,231 and 4,187 = 4,231

Accrued Liab = 4,231 * $\ddot{a}_{65}^{(12)}$ * D₆₅ ÷ D₅₆

= 4,231 * 10 * (1.07)⁻⁹
= 23,016

answer is B

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Problem 30

Under the Rolling Five Method, the calculation of withdrawal liability is relatively simple. For a 1993 withdrawal you should use the UVB as of the close of the prior year. Employer A's share of the 12/31/92 UVB is based on the ratio of employer A's contributions in the prior five years to the total contributions in the prior five years:

$$\begin{aligned} & 6,650,000 * \left(\frac{24 + 20 + 18 + 12 + 10}{1,000 + 1,100 + 1,200 + 1,000 + 1,100} \right) \\ = & 6,650,000 * \frac{84}{5,400} = 103,444 \end{aligned}$$

After determining Employer A's share of the UVB, the de minimis amount must be calculated. Then a deductible is calculated based on the amount of the de minimis and the amount of allocated UVB. The final withdrawal liability is calculated as the allocated UVB less the deductible.

The mandatory de minimis is the lesser of 50,000 or 3/4% of the plan's total UVB:

$$\text{de minimis} = \text{lesser of } 50,000 \text{ or } (.0075 * 6,650,000 = 49,875)$$

The deductible is the de minimis amount reduced by the excess of the allocated UVB over 100,000:

$$\text{deductible} = 49,875 \text{ minus } (103,444 - 100,000) = 46,431$$

The final employer withdrawal liability is $103,444 - 46,431 = 57,013$.

answer is C

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Problem 31 - Page 1

This is an atypical Section 415 benefit calculation problem, since it requires you to calculate benefits after age 65. The first step is to calculate the basic plan benefits. Next, the 415 limits must be applied.

The overall 415 limit is defined as the lesser of 115,641 or 100% of three consecutive year high compensation. The application of the 415 limits can not reduce the benefit below 10,000. The dollar maximum must be reduced pro-rata for less than 10 years of participation service. The other two limits would be reduced pro-rata for less than 10 years of service from hire.

The participant has 7 years of service at 01/01/93. Since the plan was set up at 01/01/90, the participant has 3 years of participation at 01/01/93.

Normal retirement age is defined as the later of age 65 or 5 years of participation. The participant's birth date is 01/01/28 and they are age 65 at 01/01/93. The participant's normal retirement age is 67, but the Social Security Retirement Age (SSRA) is 65. Upon retirement at age 67, the participant will have 5 years of participation service and 9 years of service. The 115,641 dollar limit will have to be increased to apply at age 67.

The definition of the actuarial increase depends on the risk of forfeiture. Notice 83-10 (G-4) states "the accumulation of value after age 65 ... must not reflect the mortality decrement to the extent that benefits will not be forfeited if the participant dies between age 65 and the date benefits actually commence". If a plan has a pre-retirement death benefit equal to the lump sum value of the participant's accrued benefit, then it is 100% true that a forfeiture does not occur at death. In this case, you must ignore 100% of the mortality decrement.

For this plan, which has that identical pre-retirement death benefit, you should use $(1+i)$ times the ratio of the annuity factors instead of the ratio of the Nx factors to calculate the actuarial increase in the 415 limits after SSRA. The interest rate should be the lesser of 5%, or the interest rate specified in the plan document (this produces a smaller 415 dollar limit).

Increase from SSRA 65 to NRA 67:

$$\begin{aligned}(1.05)^2 \ddot{a}_{65}^{(12)} \div \ddot{a}_{67}^{(12)} &= 1.1025 * 10.685 \div 10.036 \\ &= 1.1738\end{aligned}$$

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Problem 31 - Page 2

| | | | |
|--|----------|---------|-----------------------|
| Age 64 pay | (1992) | 90,000 | |
| Age 65 pay | (1993) | 94,500 | |
| Age 66 pay | (1994) | 99,225 | = 94,500 (1.05) |
| FAE3 at age 67 | (1-1-95) | 94,575 | = 283,725 / 3 |
| Projected years of service | | 9 | |
| Projected plan benefit | | 72,350 | = .85 (94,575) (9/10) |
| Years of participation | | 5 | |
| 415 Dollar limit at SSRA | | 115,641 | |
| Pro-rate for years of participation < 10 | | 57,821 | |
| 415 Dollar limit at NRA 67 | | 67,869 | = 57,821 * 1.1738 |
| 10,000 floor | | 10,000 | |
| Pro-rate for years of service < 10 | | 9,000 | |
| 100% 3 yr comp | | 94,575 | |
| Pro-rate for years of service < 10 | | 85,118 | |
| Final 415 limit - Greater of 415 floor and Lesser of (dollar or FAE3 maximums) | | 67,869 | |
| Lesser of plan ben and 415 limit | | 67,869 | |

answer is B

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Revised
07/23/95

Problem 32

When the interest rate changes, there are two effects on the MFSA. One is that there is a new base equal to the change in the UAL that must be amortized over 10 years (post PPA '87). The second effect is that any existing MFSA amortization amounts must be recalculated. The new amounts equal the outstanding base divided by an annuity at the new interest rate for the number of years remaining in the amortization period.

You can calculate the old UAL using the equation of balance at 12/31/92 under the old interest rate:

$$\begin{aligned} 8\% \text{ UAL} &= O/S \text{ 412 bases} - CB - ARA \\ &= 500,000 * (\ddot{a}_{\overline{21}|.08} \div \ddot{a}_{\overline{30}|.08}) - 30,000 - 0 \\ &= 414,883 = 444,883 - 30,000 \end{aligned}$$

$$\begin{aligned} \text{new base} &= 500,000 - 414,883 \\ &= 85,117 \end{aligned}$$

The amortization for the IAL base was 30 years at 01/01/84. Since no other changes have occurred, the 444,883 base represents the outstanding portion of the initial IAL. It should be amortized over 30 - (93 - 84), or 21 years.

$$\text{amortization for IAL base} = 444,883 \div \ddot{a}_{\overline{21}|.07} = 38,372$$

$$\text{amortization for Assump base} = 85,117 \div \ddot{a}_{\overline{10}|.07} = 11,326$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|--------|----------------|---------|
| Normal cost | 40,000 | Credit balance | 30,000 |
| IAL amort | 38,372 | | |
| Assump amort | 11,326 | 03/15 contrib | 100,000 |
| 7% Interest | 6,279 | 7% Interest | 2,100 |
| | <hr/> | | <hr/> |
| | 95,977 | | 132,100 |

The credit balance at 12/31/93 is 132,100 - 95,977 = 36,123.

answer is A

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Problem 33 - Page 1

Since Unit Credit is an individual cost method, you should check to see if an experience G/L occurred in 1992. Since you are not given actuarial and market values of assets, you can ignore the Full Funding Limitation.

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. Section 4.01 of Revenue Procedure 85-29 specifies that certain bases must be maintained regardless of the funding method that is used. These bases include waivers, shortfall gains and losses, switchback from AMFSA, and transition to satisfy the reasonable funding methods regulation.

The calculation of the normal cost must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

$$\begin{aligned} \text{PV Fut Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - \text{O/S 412 amortization bases} + \text{credit balance} + \text{ARA} \end{aligned}$$

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$. You must determine the new base such that the equation of balance is satisfied.

When the cost method change occurred at 01/01/91, there were no old 412 amortization bases. There was also an interest change at 01/01/91, but you do not have enough information to separate the effect of the two changes. The simplifying assumption that you must make is that the interest rate change occurred first while under the Aggregate method, which did not create an amortization base.

The 600,000 UAL under Unit Credit is the new charge base for the change in cost method. The amortization period of the charge base equals the remaining period from when the MFSA was first applicable to this plan (01/01/86). At 01/01/91, the remaining amortization period is 25 years.

$$\text{Method amortization} = 600,000 \div \ddot{a}_{25|0.07} = 48,118$$

Now you can calculate the expected UAL and the experience G/L for 1992 and 1993. You are given the 1991 experience loss of 50,000, which is amortized starting with the 01/01/92 valuation. You must calculate the actual UAL at 01/01/92 in order to be able to calculate the 1992 G/L.

$$\begin{aligned} 01/01/92 \text{ eUAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \\ &= 600,000 * (\ddot{a}_{24|0.07} \div \ddot{a}_{25|0.07}) - 20,000 - 0 \\ &= 570,514 = 590,514 - 20,000 \end{aligned}$$

$$\text{actual UAL} = 620,514 = 570,514 + 50,000 \text{ loss}$$

Problem 33 - Page 2

$$\text{Loss amortization} = 50,000 \div \ddot{a}_{57.07} = 11,397$$

$$\begin{aligned} 01/01/93 \text{ } {}_e\text{UAL}_1 &= (1+i)(\text{UAL}_0 + \text{NC}_0) - (\text{contrib} + i) \\ &= 1.07 (90,000 + 620,514) - 1.07 (150,000) \\ &= 599,750 \end{aligned}$$

$$\text{Experience loss} = 100,250 = 700,000 \text{ actual} - 599,750 \text{ expected}$$

$$\text{Loss amortization} = 100,250 \div \ddot{a}_{57.07} = 22,851$$

You also must use the equation of balance to derive the credit balance at 12/31/92:

$$\begin{aligned} 01/01/93 \\ {}_e\text{UAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \end{aligned}$$

$$\text{CB} = \text{O/S 412 bases} - {}_e\text{UAL} - \text{ARA}$$

$$\text{O/S bases} = 600,000 * (\ddot{a}_{237.07} \div \ddot{a}_{257.07}) + 50,000 * (\ddot{a}_{47.07} \div \ddot{a}_{57.07})$$

$$= 621,668 = 580,363 + 41,305$$

$$\text{CB} = 21,919 = 621,668 - 599,750 - 0$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|---------|-------------------|------------|
| Normal cost | 100,000 | Credit balance | 21,919 |
| Method amort | 48,118 | | |
| Loss amort '91 | 11,397 | | |
| Loss amort '92 | 22,851 | Min contrib 12/31 | x |
| 7% Interest | 12,766 | 7% Interest | 1,534 |
| | <hr/> | | <hr/> |
| | 195,131 | | x + 23,453 |

The minimum contribution at 12/31/93 is $195,131 - 23,453 = 171,678$.

answer is E

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Revised
09/10/97

Problem 34

With an individual cost method, there are two things to be aware of. One is that the Full Funding Limitation may apply. The other is that you should check for experience gains or losses each year. You are told that there was only an experience gain in 1991. This problem tests your knowledge of the handling of the Current Liability in the Full Funding Limitation under IRC Section 404.

The first step is to calculate the normal cost plus limit adjustments. You must derive the value of the experience G/L during 1991:

$$\begin{aligned} 01/01/93 \text{ UAL} &= \text{O/S bases} - \text{CB} - \text{ARA} \\ 15,000 &= \text{O/S bases} - 40,000 - 0 \end{aligned}$$

$$\text{O/S Bases} = \text{IAL} \left(\frac{271.07}{307.07} \right) - \text{Gain} \left(\frac{41.07}{51.07} \right) \quad 1991$$

$$\begin{aligned} 55,000 &= 100,000 * .9660 - \text{Gain} * .8261 \\ 1991 \text{ Gain} &= (96,597 - 55,000) \div .8261 \\ &= 50,352 \end{aligned}$$

You can set up a combined ten year amortization base for both the initial accrued liability and the gain base:

$$\text{Limit adjustment} = (100,000 - 50,352) \div \frac{107.07}{107.07} = 6,606$$

The deductible limit is the normal cost plus limit adjustments adjusted with interest to the earlier of the end of the plan year, or the end of the tax year.

$$\begin{aligned} \text{Deductible limit} &= (50,000 + 6,606) * (1.07) \\ &= 60,569 \end{aligned}$$

The second step is to check the Full Funding Limitation under 404:

$$\begin{aligned} \text{Old FFL} &= 1.07 * (50,000 + 325,000 - 307,000) \\ &= 72,760 \\ \text{New FFL} &= 1.5 * 250,000 - [1.07 * 307,000 - 1.035 * 12,000] \\ &= 58,930 \end{aligned}$$

Since the 404 FFL is less than the normal cost plus limit adjustments, you do not need to check the minimum contribution, since it won't increase the deductible limit. The deductible limit at this point equals the FFL of 58,930.

The last step is to check the unfunded Current Liability. This is available as a floor to the deductible limit when there are more than 100 participants on each day in 1993. Since you know nothing about the number of plan participants, you should ignore the unfunded Current Liability. In addition, the unfunded Current Liability is zero.

answer is B

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Problem 35

The MFSA charges should be increased by the Unpredictable Contingent Event amount plus the excess, if any, of the DRC over the MFSA charges and credits specified in Section 412(1). The DRC is defined as the sum of the unfunded old liability amount (UOLA) and the unfunded new liability amount (UNLA). In this problem, you are given the amount of the DRC.

You must subtract the IAL amortization charge and the amortization of the plan amendment under 412(b) from the DRC to calculate the additional 412(1) charge.

$$\text{IAL amortization} = 500,000 \div \ddot{a}_{\overline{30}|.08} = 41,124$$

$$\text{Amend amortization} = 100,000 \div \ddot{a}_{\overline{30}|.08} = 8,225$$

$$\begin{aligned} 412(1) \text{ charge} &= 120,000 - 41,124 \text{ IAL amort} - 8,225 \text{ plan chg amort} \\ &= 70,651 \end{aligned}$$

Since there are less than 150 plan participants, you must pro-rate the additional 412(1) charge:

$$\begin{aligned} 01/01 \text{ 412(1) charge} &= 70,651 * 2\% * (130 \text{ ees} - 100) \\ &= 70,651 * .60 \\ &= 42,391 \end{aligned}$$

The last step is to bring the 412(1) charge forward to the end of the year with interest at the current liability rate.

$$12/31/93 \text{ 412(1) charge} = 1.09(42,391) = 46,206$$

Minimum Funding Standards Account for 1993

| <u>Charges</u> | | <u>Credits</u> | |
|----------------|---------|----------------|------------|
| Normal cost | 50,000 | Credit balance | 40,000 |
| IAL amort | 41,124 | | |
| Amend amort | 8,225 | 12/31 Contrib | x |
| 8% Interest | 7,948 | | |
| 12/31 412(1) | 46,206 | 8% Interest | 3,200 |
| | <hr/> | | <hr/> |
| | 153,503 | | x + 43,200 |

The minimum contribution is $153,503 - 43,200 = 110,303$.

answer is B