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FALL 1991 EA-2 EXAM SOLUTIONS

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These solutions 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, 1991.

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 (3), but not greater than (2).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL. This UCL limit is only available to non-multiemployer plans.

Revision History:

06/18/02 Corrected minor typo in problem 2
10/22/94 Corrected problem 18
10/22/94 Eliminated reference to ARA under the Aggregate method for problem 14
11/06/93 Corrected answer range letters for problems 7, 21, and 30
10/24/93 Corrected problem 8
11/03/92 Corrected problem 20, page 2
11/03/92 Corrected text on this page for solutions to 404 problems

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Problem 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 12/31/91 is based on the valuation for the plan year beginning in that tax year. The 07/01/91 valuation should be used to determine the deductible limit needed for the answer to this problem.

The only item missing for the calculation of the deductible limit is the limit adjustment for the Initial Accrued Liability. You can derive the amount of the IAL based on the MFSA items given. As usual, you must use the relationship between the UAL, O/S 412 bases and the credit balance:

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

$$\text{UAL} = 300,000 = \text{IAL} \left(\frac{251.08}{301.08} \right) - 50,000$$

$$\begin{aligned} \text{IAL} &= 350,000 * (12.1584 \div 11.5288) \\ &= 369,115 \end{aligned}$$

$$\text{Limit adjustment} = 369,115 \div \frac{301.08}{101.08} = 50,934$$

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 07/01/91 to 12/31/91:

$$\text{Deductible limit} = (75,000 + 50,934)(1 + .08(6/12)) = 130,972$$

answer is D

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Problem 2

This problem tests your knowledge of the handling of the current liability in calculating the deductible limit. As stated at the start of these solutions, if the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL.

Since the plan was just established, the Full Funding Limitation will not come into play. If you want to be totally safe, you can calculate the minimum contribution under Section 412:

Section 412 minimum contribution calculations

The amortization of the IAL under Section 412 is based on 30 years:

$$1,000,000 \div \ddot{a}_{\overline{30}|.07} = 75,314$$

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	200,000	Credit balance	-0-
IAL amort	75,314	Contrib 12/31	x
Interest	19,272	Interest	0
	<hr/>		<hr/>
	294,586		x

The minimum contribution required under IRC Section 412 is 294,586.

Section 404 deductible limit calculations

Normal cost plus Limit adjustments based on IAL:

$$\begin{aligned} &= 1.07 (200,000 + 1,000,000 \div \ddot{a}_{\overline{10}|.07}) \\ &= 1.07 (200,000 + 133,063) \\ &= 356,378 \end{aligned}$$

One easy way to miss the problem is to assume that this is the final answer. You have not looked at the information given on the Current Liability at 12/31/91. This plan has more than 100 employees, so the unfunded Current Liability can affect the deductible limit.

Since the unfunded Current Liability of 375,000 at 12/31/91 exceeds the previously calculated deductible limit, the final deductible limit is 375,000. The credit balance at 12/31/91 assuming a contribution of 375,000 is 375,000 less the MFSA charges of 294,586, or 80,414.

answer is D

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Problem 3

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 a participant is 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, 1988 through 1991. This participant has the denominator based on years 1987 through 1991.

Calculation of Theoretical Maximum Addition

Plan Year Ending	Annual Comp	25% of Comp	1.40 x 25%	DC \$ limit	1.25 x \$	Lesser of 1.25, 1.40	Annual Addition 15% pay
12/31/87	90,000	22,500	31,500	30,000	37,500	31,500	-0-
12/31/88	100,000	25,000	35,000	30,000	37,500	35,000	15,000
12/31/89	110,000	27,500	38,500	30,000	37,500	37,500	16,500
12/31/90	130,000	*	*	*	37,500	37,500	19,500
12/31/91	150,000	*	*	*	37,500	37,500	22,500
						<hr/> 179,000	<hr/> 73,500

* These values don't need to be calculated, since 37,500 applies

$$\text{DC fraction} = 73,500 \div 179,000 = .411$$

answer is C

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Problem 4

Under the Aggregate method, there are usually no 412 amortization bases. The only exceptions would be amortization of waivers and shortfall gains or losses.

This problem is an easy one, since there is 'really nothing hidden. Since you don't have any Entry Age Normal valuation results, you can ignore the effect of the Full Funding Limitation. The only trick to the problem is that you must calculate the deficit reduction contribution and the additional 412(1) funding charge.

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 71,875, and the excess over the MFSA amortization of zero is 71,875.

The 412(1) additional funding charge must be pro-rated for plans with between 100 and 150 lives. The calculation is based on the largest number of participants on any day of the prior plan year. The pro-rata reduction equals 2% times the number of participants in excess of 100:

$$\begin{aligned}\text{Additional 412(1) funding charge} &= 2\% * (135-100) * 71,875 \\ &= .70 * 71,875 = 50,313\end{aligned}$$

Note that the 412(1) charge is normally brought forward to the end of the year with interest at the current liability rate. In this problem, the DRC is given at 12/31 already.

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	50,000	Credit balance	0
412(1) charge 12/31	50,313	Contribution 12/31	x
Interest	4,000	Interest	0
	<hr/>		<hr/>
	104,313		x

The minimum contribution at 12/31/91 is 104,313.

answer is C

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Problem 5

This is a simple asset allocation problem. You are given values for priority categories 1 through 6 in the problem. The market value must be allocated based on the values shown for Plan A. For plan A, the market value of 100,000 is equal to 100% of PC1-5 (98,000) plus a lower percent of PC6:

$$100,000 = 98,000 + x(20,000)$$

$$x = 2,000 / 20,000 = 10\%$$

Plan B's allocated market value is based on 100% of the liability for PC1-5, plus 10% of PC6:

	<u>Plan A</u>	<u>Plan B</u>
100% of PC1 through PC5	98,000	15,500
10% of PC6	2,000	200
	<hr/>	<hr/>
Market value of assets	100,000	15,700

answer is D

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Problem 6 - 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 relatively new plan with a low market value of 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 \$30 benefit level as a ratio of the accrued liability on the \$40 benefit level:

$$\begin{aligned} 01/01/91 \text{ \$30 AL} &= (30/40) * (280,000) = 210,000 \\ 01/01/91 \text{ plan change base} &= 280,000 - 210,000 = 70,000 \end{aligned}$$

The experience gain for 1990 is equal to the e_{UAL} minus the UAL:

$$\begin{aligned} e_{UAL_1} &= (1+i)(UAL_0 + NC_0) - (\text{Contribution} + \text{interest}) \\ e_{UAL_1} &= 1.08 (200,000 + 35,000) - 65,000 \\ &= 188,800 \end{aligned}$$

$$01/01/91 \text{ \$30 UAL} = 210,000 - 65,000 = 145,000$$

$$\text{Gain} = 188,800 - 145,000 = 43,800$$

$$\text{amortization for IAL base} = 200,000 \div \ddot{a}_{30|1.08} = 16,450$$

$$\text{amortization for benefit base} = 70,000 \div \ddot{a}_{30|1.08} = 5,757$$

$$\text{amortization for gain base} = 43,800 \div \ddot{a}_{5|1.08} = 10,157$$

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Problem 6 - Page 2

Minimum Funding Standards Account for 1990

<u>Charges</u>		<u>Credits</u>	
Normal cost	35,000	Credit balance	-0-
IAL amort	16,450	12/31 contrib	65,000
Interest	4,116	Interest	-0-
	<hr/> 55,565		<hr/> 65,000

The credit balance at 12/31/90 is $65,000 - 55,565 = 9,435$.

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	41,000	Credit balance	9,435
IAL amort	16,450	Gain amort	10,157
Plan chg amort	5,757	12/31 contrib	x
Interest	5,057	Interest	1,567
	<hr/> 68,264		<hr/> x+21,160

The minimum contribution at 12/31/91 is $68,264 - 21,160 = 47,104$.

answer is A

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Problem 7

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. Since you are told that no gains or losses have occurred, you don't have to worry about setting up any G/L bases.

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

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

$$20,000 = OSB + 11,000 - 1,000$$

$$OSB = 10,000 = IAL \left(\ddot{a}_{\overline{26}|.08} \div \ddot{a}_{\overline{30}|.08} \right)$$

The amortization of the IAL under Section 412 is based on 30 years:

$$\begin{aligned} 10,000 \div \ddot{a}_{\overline{26}|.08} &= IAL \div \ddot{a}_{\overline{30}|.08} \\ &= 857 \end{aligned}$$

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.

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Debit balance	11,000	Credit balance	0
Normal cost	18,000		
IAL amort	857	Contrib 12/31	x
Interest	2,309		
Late qtrly 12/31	307	Interest	0
	<hr/>		<hr/>
	32,553		x

The minimum contribution required under IRC Section 412 is 32,553.

answer is C

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Problem 8

This is tricky 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 before 1938, the limits for a Social Security Retirement Age of 65 are used. The dollar maximum of 108,963 at SSRA (see problem 20) does not have to be adjusted.

The overall 415 limit is defined as the lesser of 108,963 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.

Smith has five years of service at 01/01/91. Since Smith entered the plan at 01/01/87, he has four years of participation at 01/01/91.

Accrued Benefit as of 01/01/91	
Years of service	5
$4 * 120 * \text{service}$	5,760
10,000 minimum	10,000
Pro-rate for years of service < 10	5,000
100% 3 yr "FAE3"	9,667 = 29,000/3
Pro-rate for years of service < 10	4,833
Years of participation	4
Dollar maximum	108,963
Pro-rate for years of participation < 10	43,585
Lesser of plan ben, or greater of (415 floor and lesser of 415 dollar or FAE3 maximums)	5,000

This is calculated as follows:

lesser of 5,760 and greater of (5,000 and
lesser of (4,833 and 43,585))

answer is D

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Problem 9

Under the Rolling Five Method, the calculation of withdrawal liability is relatively simple. Employer A's share of the 12/31/90 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:

$$\begin{aligned} & 11,500,000 * \frac{(9,000 + 8,000 + 7,000 + 6,000 + 4,000)}{(400,000 + 500,000 + 600,000 + 700,000 + 800,000)} \\ = & 11,500,000 * \frac{34,000}{5 * 600,000} = 130,333 \end{aligned}$$

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. The de minimis is the lesser of 50,000 or (.0075 * 11,500,000 = 86,250).

The deductible is the de minimis amount reduced by the excess of the allocated UVB over 100,000. The deductible is 50,000 minus (130,333 minus 100,000) = 50,000 minus 30,333 = 19,667.

The final employer withdrawal liability is 130,333 - 19,667 = 110,666.

answer is D

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Problem 10

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 outstanding amount of the IAL base using the equation of balance at 12/31/90 under the old interest rate:

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \\ &= 325,000 - \text{OSB} - 20,000 - 3,000 \\ \text{O/S 412 bases} &= 348,000 \end{aligned}$$

$$\begin{aligned} \text{new base} &= 225,000 - 325,000 \\ &= -100,000 \end{aligned}$$

The amortization for the IAL base was 30 years at 01/01/85. Since no other changes have occurred, the 348,000 base represents the outstanding portion of the initial IAL. It should be amortized over $30 - (91 - 85)$, or 24 years.

$$\text{amortization for IAL base} = 348,000 \div \ddot{a}_{\overline{24}|.08} = 30,604$$

$$\text{amortization for Assump base} = 100,000 \div \ddot{a}_{\overline{10}|.08} = 13,799$$

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	25,000	Credit balance	20,000
IAL amort	30,604	Assump amort	13,799
		04/01 contrib	40,000
Interest	4,448	Interest	5,104
	60,052		78,903

The credit balance at 12/31/91 is $60,052 - 78,903 = 18,851$.

answer is B

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Problem 11

I. FALSE

The variable rate premium is reduced if the plan sponsor paid the deductible limit, but it is not reduced to zero! Instead, the variable rate premium is reduced by \$3 per plan year for each of the last five years prior to 1-1-88 that the maximum deductible limit was paid.

II. TRUE

The enrolled actuary does have to sign if the general rule is used. The enrolled actuary does NOT have to sign in any of these situations:

- (a) Alternative rule is used and there are less than 500 participants
- (b) There are no vested participants
- (c) Section 412(i) plans
- (d) Standard terminations
- (e) Small plans paying the maximum variable rate premium

III. TRUE

IV. TRUE

All but I are true, so the correct answer is A.

answer is A

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Problem 12

Since you don't have any Entry Age Normal valuation results, you can ignore the effect of the Full Funding Limitation. The only trick to the problem is that you must calculate the deficit reduction contribution and the additional 412(1) funding charge.

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 33,110 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 are given the applicable percentage as 21%.

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.

$$\begin{aligned} \text{UCL} &= 2,000,000 - (1,500,000 - 80,000) = 580,000 \\ \text{UNL} &= 580,000 - 300,000 = 280,000 \\ \text{UNLA} &= .21(280,000) = 58,800 \\ \text{DRC} &= 33,110 + 58,800 = 91,910 \end{aligned}$$

$$\begin{aligned} 01/01 \text{ 412(1) charge} &= 91,910 - 35,000 = 56,910 \\ 12/31 \text{ 412(1) charge} &= 1.09(56,910) = 62,032 \end{aligned}$$

answer is E

Note that the 412(1) charge is brought forward to the end of the year with interest at the current liability rate. Since the plan had more than 150 participants each day during 1990, the 412(1) additional funding charge does not have to be pro-rated.

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Problem 13 - Page 1

In this problem there is no need to check the Full Funding Limitation. The reason is that the Accrued liability far exceeds the assets for this newly established plan. PUC is an individual cost method, you should calculate the experience G/L each year.

The credit balance at 12/31/90 should equal the difference between the maximum and minimum contributions:

$$1990 \text{ Maximum} = 1.08 (NC + 400,000 \div \ddot{a}_{101.08})$$

$$1990 \text{ Minimum} = 1.08 (NC + 400,000 \div \ddot{a}_{301.08})$$

$$\begin{aligned} 12/31/88 \text{ CB} &= 1.08 * (400,000 \div \ddot{a}_{101.08} - 400,000 \div \ddot{a}_{301.08}) \\ &= 24,081 \end{aligned}$$

The expected UAL at 12/31/90 can be calculated based on what we expect the outstanding section 404 bases to be. If the maximum deductible limit is paid at the end of each year, the 404 bases will decrease based on a ten year interest amortization:

$$\begin{aligned} 12/31/90 \text{ } _e\text{UAL} &= 400,000 (\ddot{a}_{91.08} \div \ddot{a}_{101.08}) \\ &= 372,388 \end{aligned}$$

To calculate the actual UAL, you must determine the asset value at 01/01/91. The assets consist of the deductible limit that was paid at 12/31/90:

$$\begin{aligned} (1+i)(NC+LA) &= 1.08 (70,000 + 400,000 \div \ddot{a}_{101.08}) \\ &= 135,212 \end{aligned}$$

$$01/01/91 \text{ UAL} = 420,000 - 135,212 = 284,788$$

The experience gain for 1990 is equal to the $_e\text{UAL}$ minus the UAL:

$$\text{Gain} = 372,388 - 284,788 = 87,600$$

$$\text{amortization for IAL base} = 400,000 \div \ddot{a}_{301.08} = 32,899$$

$$\text{amortization for gain base} = 87,600 \div \ddot{a}_{51.08} = 20,315$$

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Problem 13 - Page 2

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	65,000	Credit balance	24,081
IAL amort	32,899	Gain amort	20,315
		12/31 contrib	x
Interest	7,832	Interest	3,552
	<hr/>		<hr/>
	105,731		x+47,947

The minimum contribution at 12/31/91 is $105,731 - 47,947 = 57,784$.

answer is B

You can check the calculation of the expected UAL based on the equation of balance:

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

$$\begin{aligned} 12/31/90 \text{ eUAL} &= 400,000 \left(\frac{.08}{.297} \div \frac{.08}{.307} \right) - 24,081 \\ &= 372,388 \end{aligned}$$

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Problem 14 - 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):

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

For cost methods with Unfunded Actuarial Liabilities, the comparable relationship is $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$. Under the Aggregate method, there will be no O/S 412 bases. You must determine the credit balance under the EAN method in order to do the Aggregate valuation. Under the EAN method, there were two bases, one for the IAL and one for the experience loss:

$$\text{O/S IAL base} = 350,000 \left(\frac{\ddot{a}_{257.08}}{\ddot{a}_{307.08}} \right) = 331,875$$

$$\begin{aligned} \text{Credit balance} &= \text{O/S 412 bases} - \text{UAL} = 331,875 + 10,000 - 300,000 \\ &= 41,875 \end{aligned}$$

$$\begin{aligned} \text{AGG PVNC} &= \text{PVFB} - \text{AAV} - \text{O/S bases} + \text{CB} \\ &= 600,000 - 125,000 - 0 + 41,875 + 0 \\ &= 516,875 \end{aligned}$$

$$\text{PVE/E} = 5,000,000 \div 500,000 = 10.0000$$

$$\text{NC} = 516,875 \div 10.0000 = 51,688 \text{ at } 01/01/91$$

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Problem 14 - Page 2

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	51,688	Credit balance	41,875
		Min contrib 12/31	x
Interest	4,135	Interest	3,350
	<hr/>		<hr/>
	55,823		x+45,225

In this problem you should look at the Full Funding Limitation, since you are given the Entry Age Normal accrued liability and the market value of assets. It is clear that the FFL exceeds 300,000, so it has no effect.

The minimum contribution required under IRC Section 412 is one that results in a zero credit balance:

$$55,823 = 45,225 + x$$

$$x = 10,598$$

answer is B

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Problem 15

According to Revenue Ruling 79-237, the normal cost and all amortization amounts should be pro-rated in the year of plan termination. Items that should not be pro-rated include:

- 412(b)(3)(A) Employer contribution
- 412(b)(3)(C) Amount of waived funding deficiency
- 412(b)(3)(D) Switch-back credit for AMFSA
- 412(b)(5) Interest on MFSA items
- 412(c)(6) Full Funding Limitation credit
- Beginning Credit Balance

The MFSA must be maintained through the end of the plan year that the plan is terminated. Since you do not know the market value of assets, the Full Funding Limitation can be ignored for this problem. The amortization of the IAL under Section 412 is based on 17 years, since $91 - 78 = 13$.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \\ \text{O/S 412 bases} &= \text{Credit balance} + \text{UAL} \\ &= 15,000 + 450,000 \\ &= (\text{IAL amortization}) \times \ddot{s}_{\overline{17}|.08} \end{aligned}$$

$$\begin{aligned} \text{IAL amortization} &= 465,000 \div \ddot{s}_{\overline{17}|.08} \\ &= 47,202 \end{aligned}$$

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	9/12(25,000)	Credit balance	15,000
IAL amort	9/12(47,202)	Contrib 07/01	10,000
Interest	4,332	Interest	1,600
	<hr/>		<hr/>
	58,484		26,600

The deficiency at 12/31/91 is $58,484 - 26,600 = 31,884$. The excise tax is 10% of this, or 3,188.

answer is D

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Problem 16

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 is the first problem that tests your knowledge of this detail!

Total values for various priority category combinations:

PC1 = 7,000

PC2 = 37,000

PC1 through PC6 = 169,000 PC2 through PC6 = 162,000

The market value must be adjusted to add back Smith's distribution. The new value is $200,000 + 27,000 = 227,000$. The value of the reversion based on the adjusted market value of assets is $227,000 - 169,000 = 58,000$.

Brown's share of the reversion is $58,000 * (12,000 / 162,000)$, which equals 4,296.

answer is C

Fall 1991 EA-2 Exam Solutions

Problem 17

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 given the value of 150% of the FMR, so you should use that rate to amortize the waiver.

The first step in the solution is to set up the MFSA for 1990.

$$\text{IAL amort} = 400,000 * \ddot{a}_{\overline{30}|.08} = 32,899$$

Minimum Funding Standards Account for 1990

<u>Charges</u>		<u>Credits</u>	
Normal cost	45,000	Credit balance	-0-
IAL amort	32,899	Actual cont 12/31	-0-
Interest	6,232	Interest	-0-
	84,131		-0-

The debit balance at 12/31/88 is 84,131. This is the amount of the waiver base that is set up at 01/01/89. Since this waiver is granted after 1987, use a 5 year amortization period.

$$\text{Amortization for 84,131 waiver} = 84,131 \div \ddot{a}_{\overline{5}|.1230} = 20,937$$

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Debit balance	84,131	Credit balance	-0-
Normal cost	35,000	Waiver credit	84,131
IAL amort	32,899		
Waiver amort 12/31	23,512	Min contrib 12/31	x
Interest	12,162	Interest	6,730
	187,705		x+90,861

The minimum contribution required under 412 is one that results in a zero credit balance:

$$187,705 = 90,861 + x$$

$$x = 96,843$$

answer is E

One trick is to be sure 12.30% is applied to the waiver amortization in the MFSA for 1991. You may prefer to calculate the amortization at EOY.

Fall 1991 EA-2 Exam Solutions

Revised
10/22/94

Problem 18

Since you have no information about the MFSA, the solution of this problem is simplified. You can calculate the normal cost plus limit adjustments based on the limit adjustment of 20,000:

$$(1+i)(NC+LA) = 1.08(40,000+20,000) = 64,800$$

The next step is to check the Full Funding Limitation under section 404. If you had a carryover contribution, it would not receive interest for the FFL, and it would be subtracted from the assets (excluding the carryover) adjusted with interest to the end of the year.

$$\begin{aligned}\text{old 404 FFL} &= (1+i)(AL + NC - \text{lesser MVA,AAV}) + \text{carryover} \\ &= 1.08(430,000 + 35,000 - \text{lesser}(410,000 \text{ and } 400,000)) + 0 \\ &= 70,200\end{aligned}$$

$$\begin{aligned}\text{new 404 FFL} &= 1.5(12/31 \text{ current liab}) - 1.08*(\text{lesser MVA,AAV}) + \text{carry} \\ &= 1.5(327,000) - 1.08*(\text{lesser of } 410,000 \text{ and } 400,000) + 0 \\ &= 58,500\end{aligned}$$

It appears that the FFL does apply in this problem. The deductible limit can't exceed the FFL, which gives a final result of 58,500.

You can ignore the information given on the Current Liability at 12/31/91 since you don't know if this plan has more than 100 employees.

answer is C

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Problem 19

The problem states that a partial withdrawal has occurred. You have to determine which year a 70% decline occurred.

The three year testing period ends with the year the 70% decline occurs. The base units for the "high base year" is the average of the two highest years in the preceding five year period. If 30% of the units for the "high base year" exceeds the number of units in each year of the three year testing period, then a 70% decline has occurred.

The best way to solve this problem is to set up a table and test each year from 1991 backwards to see when a 70% decline occurred:

	1991	1990	1989
3 yr test period	89-91	88-90	87-89
highest units	28,000	35,000	38,000
five prior years	84-88	83-87	82-86
average of 2 high	76,000	110,000	130,000
30% of above	22,800	33,000	39,000
70% decline ?	NO	NO	YES

answer is C

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Problem 20 - Page 1

This is a tricky 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 dollar maximum of 108,963 at age 65 has to be adjusted for the assumed retirement age of 62.

The overall 415 limit is defined as the lesser of 108,963 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 01/01/87, and Smith attains age 60 on 01/01/14. Since Smith has more than ten years of both total service and participation service at 01/01/14, the pro-rata reductions in the 415 limits will not apply.

The reductions specified in Section 415 are 6 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 a plan with no pre-retirement death benefit, it is 0% true that a forfeiture does not occur at death.

Fall 1991 EA-2 Exam Solutions

Revised
11/03/92

Problem 20 - Page 2

The resulting limitation at age 62 is

$$108,963 (1 - 3(.06667) - .05) = 108,963(.75) = 81,722.$$

Now calculate the projected plan benefit at retirement age 62:

Smith

01/01/91 Age 39

01/01/91 Service 21

Age 38 compensation 75,000

Projected age 61 compensation $75,000 * (1.04)^{23}$
= 184,854

Projected 3 year FAE greater than 150,000

Projected plan benefit at 62 $.50 * 184,854$
= 92,427

100% 3 yr FAE 415 maximum greater than 150,000

415 dollar maximum at 60 81,722

Final benefit is lesser of 415 limits and plan benefit = 81,722

answer is B

Fall 1991 EA-2 Exam Solutions

Problem 21 - Page 1

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. 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.

Revenue Ruling 81-212 specifies that when a spinoff satisfies the de minimis rule, none of the MFSA items are allocated to the smaller spun-off plan. Instead, that plan's MFSA must be set up as if it were a newly established plan. The larger plan's MFSA should treat the effect of the spinoff as an experience gain.

For Plan A before the spinoff, the equation of balance gives

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= 400,000 = \text{OSB} - 100,000 \\ \text{O/S 412 bases} &= 500,000 \end{aligned}$$

Plan B gets all of the amortization bases that were previously held by Plan A. In addition, a new base must be set up to force the equation of balance to be true for Plan B.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ \text{UAL} + \text{CB} &= \text{O/S 412 bases} \\ 365,000 + 100,000 &= 500,000 + \text{new base} \\ \text{new base} &= 465,000 - 500,000 \\ &= -35,000 \end{aligned}$$

Note that this base equals the UAL for Plan C. The amortization period for the new base is 5 years, since it is treated as an experience gain. The amortization for the IAL base was 30 years at 01/01/81. Since no other experience G/L have occurred, the 500,000 base represents the outstanding portion of the initial IAL. It should be amortized over 30 - (91 - 81), or 20 years:

$$\text{amortization for IAL base} = 500,000 \div \ddot{a}_{20|0.08} = 47,154$$

$$\text{amortization for Gain base} = 35,000 \div \ddot{a}_{5|0.08} = 8,117$$

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Problem 21 - Page 2

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	120,000	Credit balance	100,000
IAL amort	47,154	Gain amort	8,117
Interest	13,372	Min contrib 12/31	x
		Interest	8,649
	<hr/>		<hr/>
	180,526		116,766+x

The minimum contribution required under 412 is one that results in a zero credit balance:

$$180,526 = 116,766 + x$$

$$x = 63,760$$

answer is C

Fall 1991 EA-2 Exam Solutions

Problem 22

This is tricky 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 dollar maximum of 108,963 at age 66 has to be adjusted to reflect the plan's normal retirement age of 65:

$$108,963 (1 - .06667) = 101,699$$

The overall 415 limit is defined as the lesser of 101,699 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 participant has 12 years of service at 01/01/91. Since the plan was set up at 01/01/84, the participant has 7 years of participation at 01/01/91.

	Accrued Benefit as of 01/01/91
Years of service	12
4% * service * 155,000	74,400
10,000 minimum	10,000
Pro-rate for years of service < 10	10,000
100% 3 yr FAE	155,000
Pro-rate for years of service < 10	155,000
Years of participation	7
Dollar maximum	101,699
Pro-rate for years of participation < 10	71,189
Lesser of plan ben, or greater of (415 floor and lesser of 415 dollar or FAE3 maximums)	71,189

The accrued liability would be calculated as

$$71,189 * \ddot{a}_{65}^{(12)} * D_{65} \div D_{52}$$

With no pre-retirement decrements, the ratio of the D's simplifies

$$71,189 * 10 * (1.08)^{-13} = 261,761$$

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.

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} \\ &= 290,000 - 30,000 \\ &= 260,000 \end{aligned}$$

$$\begin{aligned} \text{"FIL AL"} &= \text{UAL} + \text{AAV} \\ &= 260,000 + 150,000 \\ &= 410,000 \end{aligned}$$

		<u>Plan A</u>	<u>Plan B</u>
Given	(A) EAN AL	300,000	125,000
Allocated by (A)	(B) FIL AL	410,000	170,833
Given	(C) MVA	125,000	75,000
Allocated by (C)	(D) AAV	150,000	90,000
(B) - (D)	(E) UAL	260,000	80,833
Given	(F) CB	30,000	13,000
(E) + (F)	(G) O/S bases	290,000	93,833

answer is B

Fall 1991 EA-2 Exam Solutions

Problem 24

The first step is to calculate the normal cost plus limit adjustments. You have to use the information about the MFSA amortization charge to solve for the IAL, and then calculate the limit adjustment for the IAL.

$$\text{amortization for IAL base} = \text{IAL} \div \ddot{a}_{\overline{30}|1.08} = 5,000$$

$$\begin{aligned} \text{Lim. adjust. for IAL base} &= \text{IAL} \div \ddot{a}_{\overline{10}|1.08} \\ &= 5,000 * \ddot{a}_{\overline{30}|1.08} \div \ddot{a}_{\overline{10}|1.08} \\ &= 8,389 \end{aligned}$$

$$(1+i)(\text{NC}+\text{LA}) = 1.08(7,500+8,389) = 17,160$$

The next step is to check the Full Funding Limitation under section 404. If you had a carryover contribution, it would not receive interest for the FFL, and it would be subtracted from the assets (excluding the carryover) adjusted with interest to the end of the year.

Since FIL is an aggregate type cost method, you must use the Entry Age Normal valuation results to calculate the Full Funding Limitation:

$$\begin{aligned} 404 \text{ FFL} &= (1+i)(\text{AL} + \text{NC} - \text{lesser MVA, AAV}) + \text{carryover} \\ &= 1.08(105,000 + 7,000 - \text{lesser}(100,000 \text{ and } 400,000)) + 0 \\ &= 12,960 \end{aligned}$$

It appears that the FFL does apply in this problem. The deductible limit can't exceed the FFL, which gives a final result of 12,960. This contribution is made in the 1991 MFSA at 12/31/91.

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	7,500	Credit balance	3,500
IAL amort	5,000	Ded lim 12/31	12,960
Interest	1,000	Interest	280
	13,500		16,740

The credit balance at 12/31/91 is $16,740 - 13,500 = 3,240$.

answer is B

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Problem 25 - Page 1

This is a tricky 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 before 1938, the limits for a Social Security Retirement Age of 65 are used.

The overall 415 limit is defined as the lesser of 108,963 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 01/01/75, and Smith attains age 60 on 01/01/91. Since Smith has ten years of both total service and participation service at 01/01/91, the pro-rata reductions in the 415 limits will not apply.

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 Nx factors to calculate the actuarial reduction in the 415 limits prior to age 62.

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Problem 25 - Page 2

The resulting limitation at age 62 is

$$108,963 (1 - 3(.06667)) = 108,963(.80) = 87,170.$$

The resulting limitation at age 60 is

$$87,170 * N_{62}^{(12)} \div N_{60}^{(12)} = 87,170 * 1,100 \div 1,400 = 68,491$$

Now calculate the plan retirement benefit at retirement age 60:

3 year FAE	200,000
------------	---------

plan retirement benefit at 60	.50*200,000
	= 100,000

100% 3 yr FAE 415 maximum	200,000
---------------------------	---------

415 dollar maximum at 60	68,491
--------------------------	--------

Final benefit is lesser of 415 limits and plan benefit = 68,491

answer is D

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Problem 26 - Page 1

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. The amortization period is the greater of the remaining period for amortizing the initial accrued liability, or the lesser of (i) 15 years, or (ii) the average future working lifetime of the active population.

The amount of the amortization base must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

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

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$. Since this plan was valued under the Entry Age Normal method prior to 1991, there is no base created when changing to the Frozen Initial Liability method. The reason is that the UAL after the change in cost method is the same as the UAL before the change in cost method.

There are three section 412 amortization bases in the MFSA: the IAL amortization base set up at 01/01/87, the gain base set up at 01/01/90, and the OBRA Full Funding Credit base of 50,000 that is set up at 01/01/91. You must use the equation of balance to solve for the credit balance at 12/31/90.

$$\begin{aligned} \text{EAN AL} &= \text{PVB} - \text{PVNC} = 2,200,000 - 1,100,000 = 1,100,000 \\ \text{UAL} &= \text{AL} - \text{AAV} = 1,100,000 - 363,000 = 737,000 \end{aligned}$$

O/S 412 bases:

$$\begin{aligned} &800,000 (\ddot{a}_{261.08} \div \ddot{a}_{301.08}) + 50,000 - 60,000 (\ddot{a}_{41.08} \div \ddot{a}_{51.08}) \\ &= (\ddot{a}_{261.08} * 65,798) + 50,000 - (\ddot{a}_{41.08} * 13,914) \\ &= 768,178 + 50,000 - 49,773 = 768,405 \end{aligned}$$

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \\ 737,000 &= 768,405 - \text{CB} \\ \text{CB} &= 31,405 \end{aligned}$$

The amortization period for the OBRA FFC base is 10 years:

$$50,000 \div \ddot{a}_{101.08} = 6,900$$

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Problem 26 - Page 2

To set up the MFSA for 1991, you have to calculate the normal cost:

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{UAL} \\ &= 2,200,000 - 363,000 - 737,000 = 1,100,000 \\ \text{NC} &= 1,100,000 \div (3,000,000 \div 300,000) = 110,000 \end{aligned}$$

Minimum Funding Standards Account for 1991

<u>Charges</u>		<u>Credits</u>	
Normal cost	110,000	Credit balance	31,405
IAL amort	65,798	Gain amort	13,914
OBRA FFC	6,900	Min contrib 12/31	x
Interest	14,616	Interest	3,626
	<hr/>		<hr/>
	197,314		48,945+x

The minimum contribution required under 412 is one that results in a zero credit balance:

$$197,314 = 48,945 + x$$

$$x = 148,369$$

answer is B

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Problem 27

The PBGC premium per employee is defined as the \$19 flat rate premium plus the variable rate premium. The variable rate premium is [\$9 times the unfunded vested liability divided by 1,000] divided by the number of participants.

The variable rate premium is capped at \$53, and it is further reduced by \$3 for each year prior to 1988 that the maximum deductible contribution was paid to the trust. The maximum reduction in the variable rate premium is \$15.

$$\begin{aligned}\text{Variable rate premium} &= 9 (600) \div 90 \\ &= 60, \text{ capped at } 53\end{aligned}$$

This is reduced to \$50 due to the 1987 contribution of the deductible limit. The total PBGC premium per participant is $19 + 50$, or 69.

answer is C

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Problem 28

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:

$$300,000 + 1,800,000 \div \bar{s}_{\overline{30}|.08} = 448,046$$

The deduction limitation is 448,046, 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 748,000, which equals 548,000 for the DB plan plus 200,000 for the target benefit plan. The contribution subject to excise tax is the excess of 748,000 over the deduction limitation of 448,046, or 299,954. The excise tax is 10% of this amount, which is 29,995.

answer is D

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Problem 29

You would get to take credit for any credit balance at 01/01/91 as if it was a payment toward the required quarterly contribution. Since you have no credit balance, there is an underpayment starting at 04/15/91, which is the due date of the first required quarterly installment:

DATE	REQ'D QTRLY	Amount Available	Overpayment (Underpayment)
04/15/91	5,000	-0-	(5,000)
07/15/91	5,000	10,000	-0-
10/15/91	5,000	-0-	(5,000)
01/15/92	5,000	-0-	(10,000)
04/15/92		10,000	-0-

The definition of the interest penalty is that it is interest on the amount of the underpayment for the period of the underpayment. IRS Notice 89-52 defines exactly how to calculate the penalty. You reflect interest at 175% of the FMR, and subtract the interest at the valuation rate that would be earned on the contribution (if it was paid to the MFSA) up to the end of the plan year.

Amount of the underpayment at 04/15/91 is 5,000
Period of the underpayment is three months
Calculated interest penalty is

$$5,000 [(1.1442)^{3/12} - (1.08)^{3/12}] = 74$$

Amount of the underpayment at 10/15/91 is 5,000
Period of the underpayment is six months
Calculated interest penalty (note crediting of 8% only to 12/31/91)

$$5,000 [(1.1442)^{6/12} - (1.08)^{2.5/12}] = 268$$

Amount of the underpayment at 1/15/92 is 5,000
Period of the underpayment is three months
Calculated interest penalty (note crediting of 8% only to 12/31/91)

$$5,000 [(1.1442)^{3/12} - (1.08)^{0/12}] = 171$$

Total interest penalty is $74 + 268 + 171 = 513$

answer is D

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09/11/97

Problem 30 - Page 1

You are told that there are no amortization bases at 01/01/91, which simplifies the calculation of the normal cost plus limit adjustments. The calculation of the normal cost requires that you solve for the PVNC:

$$PVNC = PVFB - AL = 600,000 - 210,000 = 390,000$$

$$NC = 390,000 \div PVL = 390,000 \div \ddot{a}_{\overline{17}|1.08} = 43,802$$

$$(1+i) * (NC+LA) = 1.08 * 43,802 = 47,306$$

One easy way to miss the problem is to assume that this is the final answer. A key point is that the calculated UAL is negative. This means that the Full Funding Limitation may apply.

In addition, you should look at the information given on the Current Liability at 12/31/91. This plan has only one employee, the Unfunded Current Liability can NOT be the deductible limit.

The Full Funding Limitation is always adjusted with interest to the end of the year. One tricky aspect is that the current liability is given at the end of the year. You must be careful not to credit interest on the end-of-year current liability.

$$\begin{aligned} \text{old FFL} &= 1.08 (AL + NC - \text{lesser MVA, AAV}) \\ &= 1.08 (210,000 + 43,802 - 225,000) \\ &= 1.08 (28,802) = 31,106 \end{aligned}$$

$$\begin{aligned} \text{new FFL} &= 1.5 [12/31 \text{ current liab}] - 1.08 * (\text{lesser MVA, AAV}) \\ &= 1.5 (185,000) - 1.08 (225,000) = 34,500 \end{aligned}$$

It appears that the FFL does apply in this problem, which gives a final deductible limit of 31,106.

answer is B

Since the FFL is less than the normal cost plus limit adjustments, there is no point in calculating the minimum funding requirement under IRC Section 412.

ADDITIONAL DISCUSSION - see next page

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Problem 30 - Page 2

ADDITIONAL DISCUSSION

One confusing aspect of this problem is the calculation of the PVNC. Some students have tried to calculate it using the basic funding formula:

$$\text{PVNC} = \text{PVFB} - \text{AAV} - 412 \text{ UAL} = \text{PVFB} - \text{AAV} - \text{O/S } 412 \text{ bases} + \text{CB} + \text{ARA}$$

The difficulty with this approach is that the problem asks for the deductible limit, so you really should not be looking at the 412 PVNC in the first place! The 412 UAL is limited to zero, based on Revenue Ruling 81-213. If you use this approach, the resulting PVNC is 375,000, and the 404 normal cost plus limit adjustments at 12/31 equal 45,487. As long as you remember to check the 404 FFL, you will still get the correct answer.

If you use the 404 relationship, you'll get the correct PVNC:

$$\begin{aligned}\text{PVNC} &= \text{PVFB} - \text{AAV} - 404 \text{ UAL} \\ &= 600,000 - 225,000 - (-15,000) \\ &= 390,000\end{aligned}$$

Does it make sense that the 404 UAL is -15,000? Remember that the information given in these EA-2 exam problems for AAV and UAL are always for 412 purposes, based on General Condition 21 from the Joint Board announcement. Since we also know there are no non-deducted contributions based on General Condition 29, then you have

$$\begin{aligned}404 \text{ AAV} &= 412 \text{ AAV} \\ &= 225,000 \\ 404 \text{ UAL} &= 210,000 - 225,000 \\ &= -15,000\end{aligned}$$

The simplest way to not get confused by all this is to think in terms of the most general relationship to derive the PVNC, which is the one used to work the problem above:

$$\text{AL} = \text{PVB} - \text{PVNC}$$

This relationship is independent of the complications of sections 404 and 412. The real saving grace of this problem is that it was constructed so that even if you calculated the "wrong" PVNC, the 404 FFL still produced the correct final answer.

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Problem 31

In this problem you are given some Entry Age Normal valuation results, but you can't check the Full Funding Limitation because you have no market value of assets.

The amount of the amortization base must satisfy the formulas that are applicable to all reasonable funding methods (1.412(c)(3)-1):

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

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$.

The next step in the problem is to derive the amount of the UAL under the Unit Credit cost method. Then you can calculate the amortization base for the change in the cost method.

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

O/S 412 bases:

$$\begin{aligned} & 30,000 * \ddot{a}_{277.08} + 5,000 * \ddot{a}_{291.08} + 20,000 (\ddot{a}_{47.08} \div \ddot{a}_{57.08}) \\ & = 354,299 + 60,255 + 16,591 = 431,146 \end{aligned}$$

$$\begin{aligned} \text{UAL} &= \text{O/S 412 bases} - \text{CB} - \text{ARA} \\ &= 431,146 - 10,000 = 421,146 \end{aligned}$$

$$\text{New base} = 470,000 - 421,146 = 48,854$$

Revenue Procedure 85-29 contains the rules for setting up a new amortization base when there is a change in cost method. The amortization period is the greater of the remaining period for amortizing the initial accrued liability, or the lesser of (i) 15 years, or (ii) the average future working lifetime of the active population.

The remaining amortization period for a plan set up at 01/01/88 would be 27 years at 01/01/91. The amortization payment at 01/01/91 for this base is

$$48,854 \div \ddot{a}_{277.08} = 4,137$$

answer is B

Fall 1991 EA-2 Exam Solutions

Problem 32

This question tests your knowledge of the handling of contributions that are deducted "in advance". The actuarial and market values of assets given in problems are those used under IRC Section 412. As specified in the regulations at 1.404(a)-14(d)(2)(i), the assets must be reduced by the amount of any non-deducted contributions.

In addition, if a contribution for the current plan year is deducted for the preceding tax year, then that contribution should be added to the Section 412 assets, and deducted from the Section 412 unfunded liability.

In this problem, the 01/01/91 valuation is used to determine the tax deduction for the tax year ending 09/30/91. The AAV of 800,000 in this problem excludes the 60,000 contribution for the 1991 plan year. Since this 60,000 was deducted for the tax year ending 09/30/90, it must be included in the asset value to determine the normal cost under Section 404.

$$\begin{aligned}\text{IRC 404 AAV} &= 800,000 + 60,000 \\ &= 860,000 \\ \text{IRC 404 PVNC} &= 4,000,000 - 860,000 \\ &= 3,140,000 \\ \text{PVE/E} &= 2,750,000 \div 250,000 \\ &= 11.0000 \\ \text{IRC 404 NC} &= 3,140,000 \div 11.0000 \\ &= 285,455\end{aligned}$$

Since the tax year does not coincide with the plan year, you must be careful in calculating the normal cost plus limit adjustments. These are adjusted with interest to the earlier of the end of the plan year, or the end of the tax year.

$$\text{Normal cost} + \text{Limit adjustments} = (1 + .08(9/12)) * (285,455) = 302,582$$

The Full Funding Limitation tests can be skipped since you have no Entry Age Normal valuation results to calculate the FFL. The deductible limit should be compared against the minimum funding requirement under IRC Section 412. However, with no waivers, experience losses, or funding deficiencies, and with a 100,000 credit balance, the minimum funding requirement would not be close to 302,582.

answer is D