$$\overline{P}(\overline{A}_{41}) = \frac{\overline{A}_{41}}{\overline{a}_{41}} = \frac{0.173703}{14.180753} = 0.012249$$

$$30{,}000\overline{P}(\overline{A}_{41}) = 30{,}000(0.012249) = 367.4700$$

The time is 10:01

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11. Your stated age is 29 and you want to buy a fully discrete three-year term life policy with a benefit of 100,000 payable at the end of year of death. Suppose that $i = 0.047$ and $p_{29} = 0.94$, $p_{30} = 0.92$, $p_{31} = 0.89$, $p_{32} = 0.86$.
The insurance company discovered your age at issue was really 30. Using the equivalence principle, the insurance company adjusted the death benefit to the level benefit it should have been at issue, given the premium charged.
Compute the adjusted death benefit.

a. 76,104
b. 76,151
c. 76,131
d. 75,965
e. 75,794

The right answer is d

Your answer was Unanswered

Here is one way of doing this problem:

Let us find the original premium based on the age at issue being 29 Recall that

$$\begin{aligned}
A^{1}_{x:\overline{3}|} &= \sum_{k=0}^{2} v^{k+1}\ {}_{k}p_x q_{x+k} \\
&= vq_x + v^2 p_x q_{x+1} + v^3\ {}_{2}p_x q_{x+2} \\
&= vq_x + v^2 p_x q_{x+1} + v^3\ p_x p_{x+1} q_{x+2} \\
&= v(1-p_x) + v^2 p_x(1-p_{x+1}) + v^3\ p_x p_{x+1}(1-p_{x+2}) \\
&= \frac{1}{1+0.047}(1-0.94) + \frac{1}{(1+0.047)^2}(0.94)(1-0.92) + \frac{1}{(1+0.047)^3}\ (0.94)(0.92)(1-0.89) \\
&= 0.2087902
\end{aligned}$$

$$\begin{aligned}
\ddot{a}_{x:\overline{3}|} &= \sum_{k=0}^{2} v^k\ {}_{k}p_x \\
&= 1 + vp_x + v^2\ {}_{2}p_x \\
&= 1 + vp_x + v^2 p_x p_{x+1} \\
&= 1 + \frac{1}{1+0.047}(0.94) + \frac{1}{(1+0.047)^2}(0.94)(0.92) \\
&= 2.6867039
\end{aligned}$$

$$\begin{aligned}
P_x &= \frac{A^{1}_{x:\overline{3}|}}{\ddot{a}_{x:\overline{3}|}} \\
&= \frac{0.2087902}{2.6867039} \\
&= 0.0777124
\end{aligned}$$

$$100{,}000P_x = (100{,}000)(0.0777124) = 7{,}771.24$$

Let us suppose that the age at issue was 30 and the premium was 7,771.24. We need to find the death benefit.

$$\begin{aligned}
A^{1}_{x:\overline{3}|} &= \sum_{k=0}^{2} v^{k+1} \ {}_kp_x q_{x+k} \\
&= vq_{30} + v^2 p_{30} q_{31} + v^3 \ {}_2p_{30} q_{32} \\
&= vq_{30} + v^2 p_{30} q_{31} + v^3 \ p_{30} p_{31} q_{32} \\
&= v(1-p_{30}) + v^2 p_{30}(1-p_{31}) + v^3 \ p_{30} p_{31}(1-p_{32}) \\
&= \frac{1}{1+0.047}(1-0.92) + \frac{1}{(1+0.047)^2}(0.92)(1-0.89) + \frac{1}{(1+0.047)^3} \ (0.92)(0.89)(1-0.86) \\
&= 0.2686040
\end{aligned}$$

$$\begin{aligned}
\ddot{a}_{x:\overline{3}|} &= \sum_{k=0}^{2} v^k_k p_x \\
&= 1 + vp_{30} + v^2 \ {}_2p_{30} \\
&= 1 + vp_{30} + v^2 p_{30} p_{31} \\
&= 1 + \frac{1}{1+0.047}(0.92) + \frac{1}{(1+0.047)^2}(0.92)(0.89) \\
&= 2.6256389
\end{aligned}$$

Let B be the adjusted death benefit, then

$$\begin{aligned}
B(0.2686040) &= (7{,}771.24)(2.6256389) \\
B &= \frac{(7{,}771.24)(2.6256389)}{0.2686040} \\
B &= 75{,}964.88
\end{aligned}$$

The time is 10:01

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12. On January 1, 2002, Pat age 40 purchases a 5-payment, 10-year term insurance of 200,000. Your are given:

(i) Death Benefits are payable at the moment of death.
(ii) Contract premiums of 8,000 are payable annually at the beginning of each year for 5 years.
(iii) $i = 0.03$.
(iv) L is the loss function at time of issue.

Calculate the value of L if Pat dies on June 30, 2005.

a. 147,403
b. 149,714
c. 147,252
d. 152,331
e. 151,909

The right answer is b

Your answer was Unanswered

Here is one way of doing this problem:

$$\begin{aligned}
L &= 200{,}000v^{3.5} - 8{,}000\ddot{a}_{\overline{4}|} \\
&= 200{,}000v^{3.5} - 8{,}000(1 + v + v^2 + v^3) \\
&= 200{,}000\left(\frac{1}{1.03}\right)^{3.5} - 8{,}000\left[1 + \frac{1}{1.03} + \left(\frac{1}{1.03}\right)^2 + \left(\frac{1}{1.03}\right)^3\right] \\
&= 149{,}714.28
\end{aligned}$$

The time is 10:01

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13. For a special 2-payment whole life insurance on (83).
Your are given:

(i) Premiums of π are paid at the beginning of years 1 and 3.
(ii) The death benefit is paid at the end of the year of death.