

EXAM M QUESTIONS OF THE WEEK

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Week of October 2/06

The expense-loaded premium, G , for a fully discrete 3-year endowment insurance of 1000 issued to (x) is calculated using the equivalence principle. Expenses are paid at the beginning of each year. You are given:

(i) $1000P_{x:\overline{3}|} = 323.12$ (ii) Expense reserve at the end of the first year is -62.22

(iii) $q_x = 1/8$ (iv) $q_{x+1} = 1/7$ (v) $i = 0.10$

(vi) <u>Expenses</u>	<u>Percentage of Premium</u>	<u>Per Policy</u>
First Year	30%	8
Renewal	10%	4

Calculate G .

The solution can be found below.

Week of October 2/06 - Solution

The level expense loading is $e = G - 1000P_{x:\overline{3}|} = G - 323.12$.

We can use the accumulation relationship for expense reserve

$({}_kV^e + e - E_k)(1 + i) - SE_{k+1} \cdot q_{x+k} = p_{x+k} \cdot {}_{k+1}V^e$, where E_k is the total expense at the start of year $k + 1$ and SE_{k+1} is the settlement expense at the end of year $k + 1$. In this problem there is no settlement expense. Also, from the Equivalence Principle, we have ${}_0V^e = 0$. The expenses at the start of the first year are $.3G + 8$.

$$(0 + G - 323.12 - .3G - 8)(1.1) = \left(\frac{7}{8}\right)(-62.22) \rightarrow G = 402.32 .$$