EXAM M QUESTIONS OF THE WEEK

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Week of July 24/06

A fully discrete whole life insurance with premiums for life with face amount \$100,000 is issued to (x). The annual benefit premium is \$2,779.01. A fully discrete one-year deferred insurance with the same face amount issued to (x), would have annual benefit premium of \$2,577.34 payable for life (starting at age (x)). These premiums are based on a particular life table and effective annual interest rate of 7.5%

Suppose that the mortality probability at age (x) is increased by .04, but all other mortality probabilities are unchanged. Find the premium for the \$100,000 fully discrete whole life policy issued to (x).

The solution can be found below.

Week of July 23/06 - Solution

$100,000P_x = 100,000 \cdot \frac{A_x}{\ddot{a}_x} = 100,000 \cdot [\frac{1}{\ddot{a}_x} - d] = 2779.01$.

$d = \frac{i}{1+i} = .069767 \rightarrow \ddot{a}_x = 10.250$.

$100,000P(_{1|}A_x) = 100,000 \cdot \frac{A_x - vq_x}{\ddot{a}_x} = 100,000 \cdot (P_x - \frac{vq_x}{\ddot{a}_x})$
$= 2779.01 - 9,075.44q_x = 2577.34 \rightarrow q_x = .0222$.

The new value of q_x is $q'_x = .0622$, and the new value of $\ddot{a}_x$ is
$\ddot{a}'_x = 1 + vp'_x \cdot \ddot{a}_{x+1}$ ($\ddot{a}_{x+1}$ is unchanged since only q_x was changed).

But, we know that $\ddot{a}_x = 1 + vp_x \cdot \ddot{a}_{x+1} \rightarrow 10.250 = 1 + \frac{.9778}{1.075} \cdot \ddot{a}_{x+1}$
$\rightarrow \ddot{a}_{x+1} = 10.170$.

Then $\ddot{a}'_x = 1 + \frac{.9378}{1.075} \cdot (10.170) = 9.872$, and
$100,000 \cdot P'_x = 100,000 \cdot [\frac{1}{\ddot{a}'_x} - d] = 100,000 \cdot [\frac{1}{9.872} - .069767] = 3,153$.