EXAM MLC QUESTIONS OF THE WEEK

S. Broverman, 2007

Week of October 8/07

A 2-decrement model has absolute rates $q_x'^{(1)} = .4$ and $q_x'^{(2)} = .5$.

Actuary A uses the following model for decrement behavior:
• decrement 1 is uniformly distributed in its associated single decrement table
• decrement 2 is discrete and occurs at time .5

Actuary B uses the following model for decrement behavior:
• decrement 1 has a constant force of decrement
• decrement 2 is discrete and occurs at time .5

Find $q_x^{(1)B} \Big/ q_x^{(1)A}$, the ratio of Actuary B's calculated value of $q_x^{(1)}$ to that of Actuary A.

The solution can be found below.

Week of October 8/07 - Solution

For both Actuaries, $q_x^{(\tau)} = 1 - p_x^{(\tau)} = 1 - p_x'^{(1)} \cdot p_x'^{(2)} = 1 - (.6)(.5) = .7$.

For Actuary A, the value of $q_x^{(2)A}$ is $[1 - \frac{1}{2} \cdot q_x'^{(1)}] \cdot q_x'^{(2)} = [1 - \frac{.4}{2}](.5) = .400$.
The value of $q_x^{(1)A}$ is $q_x^{(\tau)} - q_x^{(2)A} = .7 - .4 = .300$.

For Actuary B, the value of $q_x^{(2)B}$ is $(p_x'^{(1)})^{1/2} \cdot q_x'^{(2)} = (.6)^{1/2}(.5) = .3873$.
The value of $q_x^{(1)B}$ is $q_x^{(\tau)} - q_x^{(2)B} = .7 - .3873 = .3127$.

The ratio is $\frac{.3127}{.300} = 1.042$.