

EXAM MLC QUESTIONS OF THE WEEK

S. Broverman, 2007

Week of December 31/07

A survival distribution has the following force of mortality

$$\mu(x) = \begin{cases} \mu_1 & 0 \leq x \leq 5 \\ \mu_2 & x > 5 \end{cases}$$

You are given the following probabilities:

- ${}_{10}p_0 = .869358$
- ${}_{5|5}q_0 = .072406$

Find μ_1/μ_2 .

The solution can be found below.

Week of December 31/07 - Solution

$${}_{10}p_0 = {}_5p_0 \cdot {}_5p_5 = e^{-5\mu_1} \times e^{-5\mu_2} = e^{-5(\mu_1+\mu_2)} = .869358$$

$$\begin{aligned} {}_5|_5q_0 &= {}_5p_0 - {}_{10}p_0 = e^{-5\mu_1} - e^{-5\mu_1} \times e^{-5\mu_2} \\ &= e^{-5\mu_1} - .869358 = .072406 . \end{aligned}$$

From this equation we get $e^{-5\mu_1} = .941764$.

Then from $e^{-5\mu_1} \times e^{-5\mu_2} = .941764 \times e^{-5\mu_2} = .869358$
we get $e^{-5\mu_2} = .923117$.

$$\text{Then, } \mu_1 = -\frac{1}{5} \times \ln(.941764) = .0120$$

$$\text{and } \mu_2 = -\frac{1}{5} \times \ln(.923117) = .0160 ,$$

so that $\mu_1/\mu_2 = .75$.