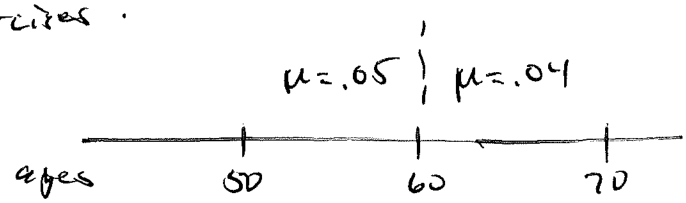
9/12/19

MLS2 Exercises:

18)




(a) $_4q_{50} = 1 - {_4p_{50}}$ $\quad {_4p_{50}} = e^{-\int_0^4 \mu_{50+t}\,dt} = e^{-\int_{50}^{54} \mu_x\,dx}$

$= e^{-.05(4)}$

(b) $_{18}p_{50} = e^{-\int_{50}^{68} \mu_x\,dx} = e^{-\int_{50}^{60}\mu_x\,dx + -\int_{60}^{68}\mu_x\,dx}$

$= \underbrace{e^{-\int_{50}^{60}}}_{_{10}p_{50}} \cdot \underbrace{e^{-\int_{60}^{68}}}_{_8p_{60}}$

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<u>Note</u>: $\mu_x = \mu \Longrightarrow {_tp_x} = e^{-\mu \cdot t} = {_tp} = p^t$

where $p = e^{-\mu}$

19) (c) $_{10}p_x = Pr(T>10)$

$= Pr(T>10 \mid s) \cdot Pr(s)$

$+ Pr(T>10 \mid ns) \cdot Pr(ns)$

Let $I$ = rvr (indicating) smoker or non-smoker

Then $_{10}p_x = Pr(T>10) = E[Pr(T>10 \mid I)]$

(d) Find the value $\pi$ such that $_\pi p_x = .25$

$.3e^{-.2\pi} + .7e^{-.1\pi} = .25$ quadratic in $e^{-.1\pi}$

20) (d) answer $= \dfrac{l_{60}^m}{l_{60}^m + l_{60}^f} = \dfrac{l_0^m \cdot {}_{60}p_0^m}{l_0^m \cdot {}_{60}p_0^m + l_0^f \cdot {}_{60}p_0^f}$

$$= \frac{.5 l_0 \cdot {}_{60}p_0^m}{.5 l_0 \cdot {}_{60}p_0^m + .5 l_0 \cdot {}_{60}p_0^f} = \frac{{}_{60}p_0^m}{{}_{60}p_0^m + {}_{60}p_0^f}$$

$$= \frac{e^{-6}}{e^{-6} + e^{-4.8}}$$

(e) $p_{60} = p_{60}^m \cdot Pr((60) \text{ is male}) + p_{60}^f \cdot Pr((60) \text{ is female})$

$p_{60} = Pr(\cancel{0<T<1}\ T>1) = E[\ Pr(\cancel{0<T<1}\ T>1 \mid I)]$

21) ${}_5p_x = \cancel{Pr(0\ T}$

$Pr(T>5) = e^{-5\mu}$

$\therefore\ {}_5p_x = E[Pr(T>5 \mid \mu)]$

$$= E[e^{-5\mu}] = \int_{.01}^{.02} e^{-5\mu} \cdot \frac{1}{.02-.01}\, d\mu$$

22) $.95 = p_x^m = e^{-\int_x^{x+1} \mu_r^m dr}$

$$= e^{-\int_x^{x+1} (\mu_r^f + .02)\, dr}$$

$$= e^{-\int_x^{x+1} \mu_r^f dr} \cdot e^{-.02}$$

$p_x^m = p_x^f \cdot e^{-.02}$