

Pstat 172B, Spring 2008: Homework 5.

1. Do problems 9.13, 9.17, 9.24, 9.25, 9.26, 9.28, 9.44, 9.45, and 9.46 from the textbook.
2. (Sample question, #53) The mortality of (x) and (y) follows a common shock model with components $T^*(x)$, $T^*(y)$ and Z .
 - (i) $T^*(x)$, $T^*(y)$ and Z are independent and have exponential distributions with respective forces μ_1 , μ_2 and λ .
 - (ii) The probability that (x) survives 1 year is 0.96.
 - (iii) The probability that (y) survives 1 year is 0.97.
 - (iv) $\lambda = 0.01$Calculate the probability that both (x) and (y) survive 5 years.

3. (Fall 2006, #17, SOA) In a population, non-smokers have a force of mortality equal to one half that of smokers. For non-smokers,

$$l_x = 500(110 - x), \quad 0 \leq x \leq 110$$

Calculate $\dot{e}_{20:25}$ for a smoker (20) and a non-smoker (25) with independent future lifetimes.

4. (Fall 2005, #22, SOA) For an insurance on (x) and (y) :
 - (i) Upon the first death, the survivor receives the single benefit premium for a whole life insurance of 10,000 payable at the moment of death of the survivor.
 - (ii) $\mu_x(t) = \mu_y(t) = 0.06$ while both are alive.
 - (iii) $\mu_{xy}(t) = 0.12$
 - (iv) After the first death, $\mu(t) = 0.10$ for the survivor.
 - (v) $\delta = 0.04$Calculate the actuarial present value of this insurance on (x) and (y) .

5. (Fall 2004, #9, SOA) For a special fully continuous last survivor insurance of 1 on (x) and (y) , you are given:
 - (i) $T(x)$ and $T(y)$ are independent.
 - (ii) $\mu_x(t) = 0.08$, $\mu_y(t) = 0.04$, $t > 0$
 - (iii) $\delta = 0.06$
 - (iv) π is the annual benefit premium payable until the first of (x) and (y) dies.Calculate π .