

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

AS381 – Section 01 (Term 171)

Date: October 19, 2017

Test 1

Duration: 50 minutes

Family Name: _____ **ID #:** 201_____0 **Serial #:** ____

1. You are given:

$$S_0(t) = \left(1 - \frac{t}{80}\right)^2, \quad 0 \leq t < 80$$

Find the following probabilities:

(a) A new born infant dies no later than age 40.

(b) A person age 40 now survives to age 60.

(c) A person age 40 now survives to age 60 but dies before attaining age 70.

(3 + 5 + 4 = 12 points)

2. You are given the following excerpt of a life table:

x	95	96	97	98	99	100
l_x	400	300	200	100	50	0

(a) Calculate ${}_3p_{95}$.

(b) Calculate ${}_2q_{97}$.

(c) Calculate ${}_2|q_{96}$.

(d) Calculate e_{95} , the *curtate* expectation of life at age 95.

(e) Assuming uniform distribution of deaths between integer ages, calculate the value of ${}_{3.25}p_{95}$.

(f) Assuming constant force of mortality between integer ages, calculate the value of ${}_{3.25}p_{95}$.

(g) Assuming uniform distribution of deaths between integer ages, calculate the value of e_{95} , the *complete* expectation of life at age 95.

(3 + 3 + 3 + 5 + 4 + 4 + 3 = 25 points)

3. You are given:

$$\mu_x = \frac{2x}{400 - x^2}, \quad 0 \leq x < 20$$

(a) Show that the survival function for the age-at-death random variable is:

$$S_0(t) = 1 - \frac{t^2}{400}$$

(b) Calculate $\dot{e}_{0:\overline{15}|}$.

(c) Calculate $\text{Var}(T_0)$.

(5 + 4 + 4 = 13 points)