Math 5068

Homework 6

Due 3/21/18

1. (*x*) and (*y*) are independent lives. The force of mortality for each is , for 0 < t < 50. Find the joint survival function for  and : .
2. Consider two independent lives (*x*) and (*y*) where y = *x* + 3. If  and , find the value of .
3. Which of the following is equivalent to  ?

(A)  (B)  (C)  (D)  (E) 

1. For two lives with future lifetime S and T you are given:

 , 

Calculate the probability that the joint status survives at least three years.

1. Tom, Dick and Harry have the same birthday, and their current ages are exactly 30,31 and 32. Their future lifetimes are independent and subject to the survival rate . Calculate the probability that they will not be alive in their 40’s simultaneously.
2. For John, currently 30 years old, the force of mortality is . For Bob, an independent life also 30 years old, it is known that:
   1. 
   2. 

Calculate the probability that at least one of John or Bob will die within 5 years.

1. For a population comprised of smokers and nonsmokers, you are given:
   1. Nonsmokers have a force of mortality equal to one half that of smokers of equal age.
   2. For nonsmokers, , 
   3. (65) is a nonsmoker.
   4. (55) is a smoker.
   5. (55) and (65) are independent lives.

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Calculate 

1. You are given:
   1. (30) and (60) are two independent lives
   2. The force of mortality for (30) is 
   3. The force of mortality for (60) is 

Calculate the probability that both lives survive 20 years.

1. XYZ Co. has just purchased two new tools with independent future lifetimes. Each tool has its own distinct DeMoivre survival pattern. One tool has a 10-year maximum lifetime and the other has a 7-year maximum lifetime. Calculate the expected time until both tools have failed.
2. For two independent lives, (40) and (50), you are given:
   1. Mortality for (40) follows DeMoivre’s Law with .
   2. Mortality for (50) follows DeMoivre’s Law with .

Calculate the expected amount of time between the two deaths of (40) and (50).

1. If Smith’s mortality is governed by constant force of mortality , and Jones’ mortality by DeMoivre’s Law with , calculate the expected future lifetime of the joint life status if Smith is age (30) and Jones age (60).
2. You are given the following:
   * + 1.  and  are independent.
       2. The survival function for (*x*) is .
       3. The survival function for (*y*) is based on constant force of mortality, , for .
       4. *n* < 95 – *x*.

Determine which of the following expressions is the probability that the joint life status (*xy*) will fail within time *n*.

(A)  (B)  (C)  (D) 

(E) None of (A), (B), (C) or (D).

1. For independent lives (x) and (y):
   1. 
   2. 
   3. Deaths are uniformly distributed over each year of age.

Calculate .

1. You are given:
   1. (40) and (50) are independent lives
   2. Mortality is as given in the Illustrative Life Table.

Find 

1. For a population whose mortality follows DeMoivre’s Law, you are given:

o

o

* 1. 

o

o

* 1. 

Calculate k.

1. For two independent lives (50) and (60), you are given:
   1. 
   2. 
   3. 
   4. 

Calculate 

1. You are given
   1. 
   2. 
   3. 
   4. 

Find  .

1. The force of mortality for males at any age is 0.08. The force of mortality for females is also constant. If the last survivor complete expectation for a male and a female is 52.5 years, find a last survivor two life complete expectation where both lives are female.