L-TAM Module 1 Section 3 Exercises

ILT – Illustrative Life Table (the one provided on the exam)

1. Using the ILT, determine each of the following:

   (a) ${}_{20}p_{25}$
   (b) ${}_{12}q_{33}$
   (c) ${}_{2|}q_{27}$
   (d) ${}_{4|3}q_{38}$

2. Given $l_x = 500(100 - x)$ where $0 \le x \le 100$, determine

   (a) ${}_{22}p_{50}$
   (b) $\overset{o}{e}_0$
   (c) $\overset{o}{e}_{27}$
   (d) e_{42}

3. Given $l_x = 500(100 - x)^2$ where $0 \le x \le 100$, determine

   (a) ${}_{50}p_{25}$
   (b) $\mu_{47}(18)$
   (c) $\overset{o}{e}_{55}$

4. Suppose $l_x = 500(100 - x^2)$ where $0 \le x \le 10$, determine

   (a) ${}_{2}p_{5}$
   (b) $\overset{o}{e}_7$

5. Given a uniform distribution of deaths and ${}_{10}d_x = 500$, determine

   (a) ${}_{10}d_{x+5}$
   (b) ${}_{3}d_x$

6. Given a uniform distribution of deaths with $q_x = .02$, determine

   (a) ${}_{10}q_x$
   (b) ${}_{5}p_x$
   (c) ${}_{5|10}q_x$
   (d) ${}_{10}q_{x+5}$

7. Given a uniform distribution of deaths, $l_{20} = 4000$, and ${}_{10}d_{50.25} = 500$, determine

   (a) the terminal age, ω, for this cohort of 20-year olds
   (b) ${}_{35}p_{40}$

8. Given a collection of newborns with terminal age 100, deaths are uniformly distributed, but with different death rates over the age ranges (0,25), (25,75), and (75, 100). If there are 1000 newborns, with 500 surviving to become 25 year olds and 400 surviving to become 75 year olds, (i.e. $l_0 = 1000$, $l_{25} = 500$, and $l_{75} = 400$) determine

   (a) l_{15}
   (b) l_{35}
   (c) ${}_{20}p_{15}$

9. Given mortality for (30) is DML(90), determine

   (a) $E[T_{30}]$, the expected value of T_{30}
   (b) $Var(T_{30})$, the variance of T_{30}

10. Given mortality for (x) is CF(.025), determine

    (a) $E[T_x]$, the expected value of T_x
    (b) $Var(T_x)$, the variance of T_x

11. Suppose $l_x = 500e^{-.02x}$, determine

    (a) ${}_tp_x$
    (b) $\overset{o}{e}_x$
    (c) e_x

12. Suppose $l_x = 500(0.95)^x$, determine

    (a) ${}_tp_x$
    (b) $\overset{o}{e}_x$
    (c) e_x

13. Given ${}_{k|}q_x = 0.1(0.9)^k$, for $k = 0, 1, 2, \cdots$, determine
    (a) p_x, ${}_2p_x$, ${}_3p_x$, and generally ${}_kp_x$
    (b) e_x