Homework 2: Due Wednesday, December 3, 2014

1. You are given the following information from a life table:

x	l_x	d_x	p_x	q_x
95				0.40
96			0.20	
97		72		1.00

   - $l_{90} = 1000$ and $l_{93} = 825$
   - Deaths are uniformly distributed over each year of age.

   Calculate the probability that (90) dies between ages 93 and 95.5.

2. A special temporary (term) life annuity-due on (30) provides payments of t in year $t = 1, 2, 3$. You are given

   - $q_{30} = 0.01$
   - $q_{31} = 0.015$
   - $q_{32} = 0.02$
   - $i = 0.04$

   Compute the actuarial present value of this annuity.

3. You are given

   - $\bar{A}_x = 0.3$
   - $\bar{A}_{x:\overline{20|}} = 0.4$
   - $i = 0.05$
   - $_{20}p_x = 0.7$

   Calculate $\bar{a}_{x:\overline{20|}}$.

4. You are given

   - $\delta = \begin{cases} 0.04, & \text{for } 0 \le t \le 5 \\ 0.03, & \text{for } t > 5 \end{cases}$
   - $\mu = 0.01$

   Calculate $\bar{a}_{x:\overline{10|}}$.

5. You are given

k	$\ddot{a}_{\overline{k}|}$	$_{k-1|}q_x$
1	1.00	0.33
2	1.93	0.24
3	2.80	0.16
4	3.62	0.11

Calculate $\ddot{a}_{x:\overline{4}|}$.

6. Suppose that the force of mortality and the force of interest are both constant, say $\mu_{x+t} = \mu$ and $\delta_t = \delta$, for all $t \geq 0$. Find an expression for $\bar{a}_{x:\overline{1}|}$ in terms of μ and δ.

7. You are given

- $^2\bar{A}_x = 0.08$
- $\delta = 0.10$
- $\mathrm{Var}[\bar{a}_{\overline{T_x}|}] = 4$

Determine the actuarial present value of a continuous whole life annuity of 1 payable while (x) survives.

8. You are given

- Deaths are uniformly distributed over each year of age.
- $_{5|}\ddot{a}_{x:\overline{10}|} = 5.3$
- $_5E_x = 0.60$
- $_{15}E_x = 0.20$
- $i = 0.10$

Calculate $_{5|}\ddot{a}^{(12)}_{x:\overline{10}|}$.