MAP 4176 / 5178 Name:_____
Test 7 Date: February 27, 2018

Each problem is worth 10 points. Show all work for full credit, and use correct notation.

1. Given $q_{75} = .02$ and $d = 10\%$ determine the standard deviation of the present value random variable for a 2-year temporary annuity due issued to (75) with the first year's payment equal to 1500 and the second year's payment equal to 2000.

2. For independent lives (x) and (y), you are given:

   (i) Mortality for (x) follows a constant force model with $\mu_x = 0.02$

   (ii) Mortality for (y) follows a constant force model with $\mu_y = 0.04$

   You are also given $\delta = 0.03$.

   Determine the variance of the present value random variable for a continuous annuity that pays an annual rate of 9 per year until the earlier of the death of (x) and (y). (Recall that for independent lives, $\mu_{xy} = \mu_x + \mu_y$)

3. Use SULT actuarial assumptions and the claims acceleration approach to calculate the variance of the present value random variable for a whole life annuity due issued to (20) with quarterly payments of 250.
   Note that $i = 0.05 \Rightarrow d^{(4)} = 0.04849$.

4. Use SULT actuarial assumptions and assume a uniform distribution of deaths between integer ages to determine the variance of the present value random variable for a continuous 10-year temporary annuity of 100 per year issued to (20).

5. For a given annual effective interest rate i, you are given:

   (i) $A_x^{(12)} = 0.7$

   (ii) $\ddot{a}_x^{(12)} = 10$

   Determine i.