

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

1. You are given:

(i)  $\pi = \frac{\bar{A}_x}{\bar{a}_x}$

(ii)  $\bar{a}_x = 10$

(iii)  $\delta = 0.06$

Determine  $\pi$ .

2. You are given:

(i)  $d = 0.05$

(ii)  $q_x = 0.02$

(iii)  $A_x = .4$

Determine the  $\ddot{a}_{x+1}$ .

3. A whole life insurance issued to (40) pays 1000 at the end of the year of death. Using ILT actuarial assumptions, determine the actuarial accumulated value at age 50 of past benefits.

4. For a continuous whole-life annuity issued to (50) with annual payment rate of 1000, you are given:

- (i) Mortality follows the Illustrative Life Table
- (ii)  $i = 0.06$
- (iii) Deaths are uniformly distributed between integer ages.

Determine the variance of the present value random variable for this annuity.

5. For a whole-life annuity due issued to (30) with monthly payments of 1000, you are given:

- (i) Mortality follows the Illustrative Life Table
- (ii)  $i = 0.06$
- (iii) Deaths are uniformly distributed between integer ages.

Determine the probability that the present value of the payments is less than 100,000.