

Show all work for full credit, use correct notation, and clearly mark your answer.

1. For a fully discrete whole life insurance of 50,000 issued to (35) with annual premiums, you are given:

(i) Mortality follows the Illustrative Life Table

(ii)  $i = 0.06$

Show that the premium for which the expected value of the loss-at-issue present value random variable equals 0 is 418.

2. Using the same actuarial assumptions as in #1, determine the variance of the loss-at-issue present value random variable in #1.

3. For a fully continuous whole life insurance of 1 issued to ( $x$ ) with annual premium rate,  $\pi = 0.04$ , you are given:

(i)  $\mu = 0.04$

(ii)  $\delta = 0.06$

Determine the variance of the loss-at-issue present value random variable.

4. For a fully discrete 2-year endowment insurance on  $(x)$ , you are given

(i) The death benefit is 3000 in year 1 and 2000 in year 2

(ii) The maturity benefit is 2000

(iii) The annual premium is 1150.

(iv)  $p_x = 0.75$

(v)  $d = 0.1$

Determine the variance of the loss-at-issue present value random variable for this insurance.

5. For a fully discrete 20-year endowment insurance of 1000 issued to  $(40)$ , you are given:

(i) The death benefit is paid at the end of the month of death.

(ii) A premium of 3 is paid at the beginning of each month.

(iii) There is a uniform distribution of deaths between integer ages.

(iv)  ${}^2A_{40:\overline{20}|}^{(12)} = 0.12097$

Using ILT actuarial assumptions, determine the variance of the loss-at-issue present value random variable for this insurance.