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) \(2A^{(12)}_{40:20} = 0.12097\)

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