

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

1. For a fully discrete whole life insurance of 1000 issued to (40), you are given:

(a) Mortality follows the Illustrative Life Table.

(b) $i = 0.06$

(c) Annual premiums equal 11.

Calculate the reserve at time 20.

2. For a 3-year fully discrete term insurance of 300,000 issued to (30), you are given:

(a) Annual premiums of 700 are paid at the beginning of each year.

(b) $q_{32} = .02$

(c) $d = .05$

Calculate $\sqrt{\text{Var}({}_2L)}$

3. For a fully discrete whole life insurance of 1000 issued to (30), you are given:

(a) Mortality follows the Illustrative Life Table.

(b) $i = 0.06$

(c) Annual premiums equal 6.6.

Calculate $\text{Var}({}_2L)$.

4. For a fully continuous whole life insurance of 9000 issued to (30), you are given:

(a) $\bar{A}_{30} = 0.40$

(b) $\bar{A}_{40} = 0.44$

Determine the net premium reserve at age 40.

5. For a fully continuous whole life insurance of 90 issued to (x), you are given:

(a) $\bar{A}_x = 0.10$

(b) $\bar{A}_{x+10} = 0.15$

(c) ${}^2\bar{A}_{x+10} = 0.05$

(d) Annual premiums are determined by the equivalence principle.

Determine $Var({}_{10}L)$.

6. For a 5-pay 20-year deferred whole life annuity due issued to (40), you are given:

(a) Mortality follows the Illustrative Life Table.

(b) $i = 0.06$

(c) Annual payments of 20,000 begin at age 60.

(d) Premiums are determined by the equivalence principle.

Calculate ${}_{10}V$.

7. For a fully discrete 10-year endowment insurance on (30) , you are given:

- (a) Mortality follows the Illustrative Life Table.
- (b) $i = 0.05$
- (c) The death benefit is 1000 each year.
- (d) The maturity benefit is 1000.
- (e) Annual premiums of 80 are payable at the beginning of each year.

Calculate the reserve at time 8.

8. For a fully continuous 20-year endowment insurance on (35) , you are given:

- (a) Mortality follows the Illustrative Life Table.
- (b) $i = 0.06$
- (c) The death benefit is 5000.
- (d) The maturity benefit is 5000.
- (e) Deaths are uniformly distributed between integer ages.

Calculate the net premium reserve at time 10.

9. For a fully discrete 20-year term insurance on (50) , you are given:

- (a) Mortality follows the Illustrative Life Table.
- (b) $i = 0.11$
- (c) The death benefit is 7500 during the first year and 10,000 in subsequent years.
- (d) The first year premium is 305.92, and X in subsequent years.
- (e) X is determined by the equivalence principle.

Calculate the reserve at time 1.

10. For a fully discrete 10-year endowment insurance issued to (30), you are given:

(a) The death benefit in the first year equal to 1000. Subsequent years' death benefit is 500 more than the previous year's death benefit.

(b) The amount of the pure endowment is 10,000.

(c) Premiums are determined by the equivalence principle.

(d) Mortality follows the Illustrative Life Table.

(e) $i = 0.06$

Calculate the reserve at the beginning of year 10 (This means the reserve immediately after the premium is paid at the beginning of year 10).