Module 3 Section 5 Exercises:

1. 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 1000

   (iii) Expenses, payable at the beginning of the year are:
   (a) Taxes are 2% of the gross premium
   (b) Commissions are 3% of the gross premium
   (c) Other expenses are 15 in the first year and 2 in the second year

   (iv) $i = 0.04$, $p_x = 0.9$, and $p_{x+1} = 0.8$

   Determine the annual gross premium using the equivalence principle.

2. For a semi-continuous n-year term insurance of 1000 issued to (x), you are given:

   (i) deaths are uniformly distributed between integer ages

   (ii) $i = .05$

   (iii) $1000P_{\overline{x:n|}}^{1} = 6.73$

   (iv) Expenses are 10 payable at the beginning of each year

   Determine the annual gross premium using the equivalence principle.

3. For a fully discrete whole life insurance of 100,000 on (35) you are given:

   (i) Percent of premium expenses are 10% per year.

   (ii) Per policy expenses are 25 per year.

   (iii) Per thousand expenses are 2.50 per year.

   (iv) All expenses are paid at the beginning of the year.

   (v) $1000P_{35} = 8.36$

   Determine the expense loading, i.e. expense premium.

4. For a fully discrete 15-payment whole life insurance of 100,000 on (x), you are given:

   (i) $100{,}000A_x = 51{,}481.97$

   (ii) $a_{x:\overline{14}|} = 10.35$

   (iii) $d = .02913$

   (iv) Expenses are incurred at the beginning of the year.

   (v) Percent of premium expenses are 10% in the first year and 2% thereafter.

   (vi) Per policy expenses are 10 in the first year and 5 in each year thereafter until death.

   Determine the gross annual premium using the equivalence principle.

5. For a fully continuous whole life insurance of 1 on (x), you are given:

   (i) $\delta = 0.04$

   (ii) $\bar{a}_x = 12$

   (iii) Expenses are

   (a) 0.02 initial expense
   (b) 0.003 per year, payable continuously

   (iv) The gross premium is the net premium plus 0.0066.

   Determine the expected loss-at-issue.