Module 4 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 $p_{x+1} = 0.8$
   (v) using the equivalence principle, the annual gross premium is 735.68
   (vi) the annual net premium is 689.93

   Determine

   (a) the acquisition expense
   (b) the gross premium reserve at time 1
   (c) the net premium reserve at time 1
   (d) the deferred acquisition cost at time 1 (i.e. the expense reserve at time 1)

2. Redo Number 1 with the expenses in part (iii)(c) equal to 2 in each year. Note that this changes the annual gross premium using the equivalence principle to 728.35.

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

   (i) $\mu = 0.04$ and $\delta = 0.06$
   (ii) the annual gross premium (rate), payable continuously for a maximum of 10 years, is 0.072
   (iii) expenses are
      (a) 0.02 initial expense
      (b) 0.003 per year, payable continuously for the lifetime of $(x)$

   Determine the gross premium reserve at time 5.
4. For a fully discrete whole life insurance of 10,000 issued to (40), use ILT actuarial assumption to determine the full preliminary term reserve at age 60, \( 20V^{PT} \).

5. For a fully discrete 11-year term insurance of 50,000 issued to (39), use ILT actuarial assumptions to determine \( 6V^{PT} \).