Show all work for full credit, and use correct notation. Simplify answers completely. See other side for additional problems.

1. For a fully discrete whole life insurance of 150,000 issued to (40), you are given:
   (i) $\dd{a}_{40} = 15$
   (ii) $\dd{a}_{55} = 12$
   (iii) $d = 0.06$
   (iv) $p_{40} = 0.98$
   (v) The only expenses are 50 at the beginning of every year

Determine

(a) (10 points) the gross premium using the equivalence principle, and the corresponding gross premium reserve at time $k = 15$

(b) (10 points) the expense premium and the corresponding expense premium reserve at time $k = 15$

(c) (10 points) the full preliminary term reserve at time $k = 15$
2. For a fully discrete insurance issued to \((x)\) you are given:

(i) the death benefit is 10000

(ii) the annual premium is 750

(iii) \(p_{x+6} = 0.95\) and \(p_{x+7} = 0.90\)

(iii) \(i = 4\%\)

(iii) \(\delta V = 3000\)

Determine \(\delta V\)

3. For a fully discrete whole life insurance of 10000 issued (30), you are given:

(i) the death benefit is paid at the end of the quarter of death

(ii) premiums of 15 are paid at the beginning of each quarter

(iii) \(A_{40} = 0.15\)

(iv) \(i = 0.05\)

Assuming a uniform distribution of deaths between integer ages, determine the reserve at time \(k = 10\).