

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) $\ddot{a}_{40} = 15$
- (ii) $\ddot{a}_{55} = 12$
- (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
- (ii) $p_{x+6} = 0.95$ and $p_{x+7} = 0.90$
- (iii) $i = 4\%$
- (iii) ${}_8V = 3000$

Determine ${}_6V$

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 $k = 10$.