

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

For Numbers 1 through 4, use the following:

For a fully discrete whole insurance of 10,000 on (50), you are given:

- (i) Mortality follows the ILT
- (ii) $i = 0.06$
- (iii) The annual gross premium is 1.3 times the annual net premium.
- (iv) A settlement expense of 500 is owed at the time the death benefit is paid.
- (v) Per policy expense are:
100 in the first year; 10 in renewal years
- (vi) Percent of premium expenses are:
60% in the first year; 5% in renewal years

1. Calculate the gross premium reserve at time $t = 10$.

2. Calculate the net premium reserve at time $t = 10$.

3. Calculate the expense reserve at time $t = 10$.

4. Calculate the full preliminary term reserve at time $t = 10$, ${}_{10}V^{FPT}$.

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

- (i) The death benefit is 10,000. There is a settlement expense of 100.
- (ii) The withdrawal benefit for year 11, paid at EOY, is 1500.
- (iii) The annual gross premium is 300
- (iv) Expenses paid at the beginning of year 11 are 5% of gross premium
- (v) $v = 0.9$
- (vi) $q_{x+10}^{(d)} = .02$ and $q_{x+10}^{(w)} = .10$
- (vii) The gross premium reserve at time 11 is 230.

Determine the gross premium reserve at time 10