

## STAT 472

### Quiz 6

Fall 2018

November 14, 2018

1. A whole life policy is issued to (70) with a death benefit of 25,000 paid at the end of the year of death. Premiums are determined by the equivalence principle and are paid annually for the life of the policy.

The reserve basis is the Standard Ultimate Life Table with interest at 5%.

- a. (4 points) Calculate the net premium for this policy.

**Solution:**

$$PVP = PVB \implies P\ddot{a}_{70} = 25,000A_{70} \implies P(12.0083) = 25,000(0.42818)$$

$$P = \frac{25,000(0.42818)}{12.0083} = 891.425$$

- b. (6 points) Calculate the net premium reserve at the end of the 10<sup>th</sup> year.

**Solution:**

$${}_{10}V^n = PVFB - PVFP$$

$$= 25,000A_{80} - 891.425\ddot{a}_{80} = 25,000(0.59293) - 891.425(8.5484) = 7202.99$$

2. A whole life policy is issued to (70) with a death benefit of 25,000 paid at the end of the year of death. The gross premium paid annually for the life of the policy is  $P$ . This premium was NOT determined by the equivalence principle.

The reserve basis is the Standard Ultimate Life Table with interest at 6%. (Note that the interest rate is NOT 5%.)

The expenses for this policy are:

- Commissions of 50% of premiums in the first year and 9% thereafter.
- Per policy expenses of 300 in the first year and 50 each year thereafter.
- Claim expense of 350 paid at the end of the year of death.

The gross premium reserve at the end of the 10<sup>th</sup> year is 6000.00. The gross premium reserve at the end of the 11<sup>th</sup> year is 6894.60.

Determine  $P$ .

**Solution:**

$${}_{11}V^g = \frac{({}_{10}V^g + P_{10} - e_{10} - X_{10}^{BOY})(1+i) - (S_{11} + E_{11})q_{80}}{P_{80}}$$

$$6894.60 = \frac{(6000 + 0.91P - 50)(1.06) - (25,000 + 350)(0.032658)}{(1 - 0.032658)}$$

$$P = \frac{\left[ \frac{6894.60(1 - 0.032658) + (25,350)(0.032658)}{1.06} - 5950 \right]}{0.91} = 1234$$