

Module 3 Section 4 Exercises:

For Numbers 1 – 12, use ILT assumptions. Unless told or implied otherwise, net premiums are level.

1. Determine P_{40}
2. Determine $P_{\overline{1}_{40:20}}$
3. Determine $P_{\overline{\frac{1}{40:20}}}$
4. Determine $P_{40:\overline{20}}$
5. $P_{40:50}$, the level premium for an insurance that pays 1 at the end of the year of the first death of (40) and (50) with premiums paid at the beginning of each year that both are alive
6. $P_{\overline{40:50}}$, the level premium for an insurance that pays 1 at the end of the year of the last death of (40) and (50) with premiums paid at the beginning of each year that at least one of them is alive.
7. Determine the net annual premium for a fully discrete whole life insurance of 5000 issued to (40) with premiums payable for a maximum of 20 years.
8. Determine the net annual premium for a semi-continuous whole life insurance of 5000 issued to (40). The death benefit is paid at the moment of death. Use the claims acceleration approach to determine the EPV of the death benefit.
9. Determine the net quarterly premium for a semi-continuous whole life insurance of 5000 issued to (40). The premiums are paid at the beginning of each quarter for life. Assume a uniform distribution of deaths between integer ages.
10. Determine the net monthly premium for a fully discrete 20-year term insurance of 10000 issued to (40). Use the three-term Woolhouse formula to determine the EPV of the premiums.
11. Determine the variance of the loss-at-issue present value random variable for a fully discrete whole life insurance of 1000 issued to (40) with annual premiums determined by the equivalence principle.
12. The insurance in the previous problem is sold to 100 independent 40-year olds. Use the normal approximation to determine the probability that there will be a total loss of at most 1500 on the entire block of policies.

13. Given $p_{60} = .98$, $v = .9$, and $A_{60} = .4$, determine the net annual premium for a fully discrete whole life insurance of 10,000 issued to (61).
14. Given $\ddot{a}_x = 6$ and $d = 0.1$, determine the quarterly premiums for a fully discrete whole life insurance of 1000 issued to (x) with benefit paid at the end of the quarter of death, using the two-term Woolhouse approximation to determine both the EPV of premiums and the EPV of benefits.