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

1. Using ILT assumptions determine
   (a) the expected present value for a whole-life insurance of 5,000 issued to
   independent lives, both age 40, with benefit payable at the end of the year of the
   second death.

   (b) the variance of the present value random variable for the insurance in part (a)

2. Determine the actuarial present value of a 10-year term insurance issued to (40)
   with death benefit payable at the end of the year of death. The death benefit is
   25000 − 1000n if death occurs during year n, for n = 1, 2, ..., 10.
   (You are given $A_{40:10}^1 = 0.17094$ and $(IA)_{40:10}^1 = 0.96728$.)
3. Using \( i = .05 \) and ILT mortality, determine the variance of the present value random variable for a 3-year discrete term insurance issued to (30) with death benefit equal to 3 in the first year, 5 in the second year, and 7 in the third year.

4. You are given:

| \( j \) | \( A_x^{(\text{Dec } j)} \) | \( A_x^{(\text{Dec } j)}_{x:|n|} \) |
|--------|-----------------|-----------------|
| 1      | 0.150           | 0.420           |
| 2      | 0.465           | 0.585           |

You are also given \( nE_x = 0.3 \). A discrete whole life insurance issued to \((x)\) pays 50 if departure occurs within \( n \) years by decrement 2, pays 100 if departure occurs after \( n \) years by decrement 1, and pays nothing otherwise. Determine the EPV of the insurance