1. A whole life policy on (25) has a death benefit of 100,000 for the first 20 years. The death benefit for the 20 years from age 45 to 65 is 50,000. After age 65, the death benefit is 20,000. The death benefits are payable at the end of the year of death.

You are given that mortality follows the Illustrative Life Table with interest at 6%.

Calculate the Actuarial Present Value for this decreasing whole life policy.

\[
APV = (100,000) \cdot A_{25} - (50,000) \cdot E_{25}A_{45} - 30,000 \cdot E_{25}A_{65}
\]

\[
= (100,000)(0.08165) - (50,000)(0.29873)(0.20120) - (30,000)(0.29873)(0.25634)(0.43980)
\]

\[
= 4149.43
\]
2. \( Z \) is the present value random variable for a whole life insurance on (60) with a death benefit of 1000 payable at the moment of death.

You are given that:
   a. Mortality follows the Illustrative Life Table
   b. \( i = 0.06 \)
   c. Deaths are uniformly distributed between integral ages.

Calculate the \( \Pr(Z > E[Z]) \).

\[
Z = 1000 \cdot v^{T_{60}}
\]
\[
E[Z] = 1000 \cdot A_{60} = \frac{i}{1 - 0.06} \cdot 1000 \cdot A_{60} = 1.02971 \times 369.13 \approx 380.09685
\]

\[
\Pr(Z > E[Z]) = \Pr\left(1000 \cdot v^{T_{60}} > 380.09685\right)
\]
\[
= \Pr\left(T_{60} < \frac{\ln(0.38009685)}{\ln(v)} \approx 16.60112\right)
\]
\[
= 16.60112 \cdot q_{60}
\]
\[
= 1 \cdot \frac{l_{76.60112}}{l_{60}}
\]
\[
= 1 \cdot \frac{(1 - 0.60112) \cdot l_{76} + 0.60112 \cdot l_{77}}{l_{60}}
\]
\[
= 1 \cdot \frac{0.39888 \times 5,117,152 + 0.60112 \times 4,828,182}{8,188,074}
\]
\[
\approx 0.39626
\]