Bruce and Robbie each open up new bank accounts at time 0. Bruce deposits 100 into his bank account, and Robbie deposits 50 into his. Each earns an annual effective discount rate of \( d \). The amount of interest earned in Bruce’s account during the 11-th year is equal to \( X \). The amount of interest earned in Robbie’s account during the 17-th year is also equal to \( X \). Calculate \( X \).

A. 28.0  
B. 31.3  
C. 34.6  
D. 36.7  
E. 38.9

Solution.

The amount of interest earned by Bruce in the 11-th year is:

\[
100 \frac{(1-d)^{-10}}{(1+i)^{10}} \cdot \frac{(1-d)^{-1}}{1} = X. 
\]

The amount of interest earned by Robbie in the 17-th year is:

\[
50 \frac{(1-d)^{-16}}{(1+i)^{16}} \cdot \frac{(1-d)^{-1}}{1} = X. 
\]

Therefore,

\[
100 (1-d)^{-10} \cdot (1-d^{-1}) - 1 = 50 (1-d)^{-16} \cdot (1-d^{-1}) - 1. 
\]

This implies that \( 2 = (1-d)^{6} \). The solution is \( d \approx 10.91\% \). Therefore,

\[
X = 100 (1-d)^{-10} \cdot (1-d^{-1}) - 1 \approx 38.88. 
\]

Answer E.