Quiz #6

If $250 is deposited at the end of each month in an annuity account that earns 6.5% interest how much will it be worth in 40 years and 6 months? (round to the nearest penny)

\[
FV = \frac{pymt \left( \left( \frac{1 + \frac{.065}{12}}{\frac{12}{12}} \right)^{486} - 1 \right)}{\frac{1}{2}}
\]

\[
250 \times \left( \left( 1 + \frac{.065}{12} \right)^{486} - 1 \right) \div \left( .065 \div 12 \right) = 591232.6729...
\]

\[
\$ 591,232.67
\]
5.4 Amortized Loans

A home loan for $165,000 at 3.6% interest and monthly payments for 30 years. How big is each payment?

\[
P(1+i)^n = \text{pymt} \frac{(1+i)^n - 1}{i}
\]

\[
165000 \left( 1 + \frac{0.036}{12} \right)^{360} = \text{pymt} \frac{(1 + \frac{0.036}{12})^{360} - 1}{\frac{0.036}{12}}
\]

\[
= \frac{165000 \left( 1 + \frac{0.036}{12} \right) \cdot 0.036 \cdot \frac{360}{12} - 1}{(1 + \frac{0.036}{12})^{360} - 1}
\]

\[
\text{pymt} = 750.1648...
\]

[Round to 750.16]

What if it is only a 20 year loan?

\[
\frac{165000 \left( 1 + \frac{0.036}{12} \right) \cdot 0.036 \cdot \frac{240}{12} - 1}{(1 + \frac{0.036}{12})^{240} - 1}
\]

\[
= 965.43
\]

"Amortization Schedule"
"Unpaid Balance"

Sam has a home loan for $165,000 at 3.6% interest with monthly payments for 30 years. After 10 years, Sam wins the lottery! Sam uses part of the winnings to pay off the house so there will be no more mortgage payments to worry about. What is the outstanding balance?

Start with: \[ P(1+i)^n = pymt \left( \frac{(1+i)^n - 1}{i} \right) \]

but realize that \( n \) is not yet the full 360.

\[
165000 \left( 1 + \frac{.036}{12} \right)^{120} - \frac{(1 + \frac{.036}{12})^{120} - 1}{\frac{.036}{12}} \]

\[ \approx 128,209.57 \]