Suppose you are buying a house. After your downpayment, closing costs, etc., you are to finance $150,000 at 4.08% to be paid back over 30 years.

(a) Compute the monthly payment.

\[ M = \frac{P \times \left( \frac{r}{12} \right)}{1 - \left(1 + \frac{r}{12}\right)^{-n}} = \]

(b) How much will you pay over the course of 30 years? How much goes to interest?

(c) For the first three months of payments using the payment from (a), make a chart that shows your payment, how much goes to interest, how much goes to principle, and the balance due.
(d) After 10 years of payments:

(i) How much have you paid in?  

(ii) What is the balance due?

\[ B_k = P \left(1 + \frac{r}{12}\right)^k + \frac{12M}{r} \left(1 - \left(1 + \frac{r}{12}\right)^k\right) \]

(iii) How much of the loan have you paid off?  

(iv) How much of your payments have gone to interest?

(e) Instead of continuing to pay for 20 more years, you decide to finish in 12 more years of payments. Compute the monthly payment that would be required to pay off the balance from (d) in 12 years at 4.08% interest.

\[ M = \frac{P \times \left(\frac{r}{12}\right)}{1 - \left(1 + \frac{r}{12}\right)^{-n}} \]

(f) On second thought, you decide to start paying $1500 a month after the initial 10 years of payments. How many more payments will be required? Also express the result as xx years, yy months (e.g. finish in 12 yrs, 2 months of payments).

\[ m = \frac{-\log \left(1 - \frac{Br}{12C}\right)}{\log(1 + r/12)} \]
You borrow $175,000 at 3.9% for 25 years.

(a) Compute your required monthly payment.

(b) Compute your balance $B$ after 5 years of payments.

(c) Instead of continuing to pay for 20 more years, you decide to finish in 10 more years of payments. Compute the monthly payment that would be required to pay off the balance $B$ from (b) in 10 years at 3.9% interest.

(d) On second thought, you decide to start paying $1300 a month after the initial 5 years of payments. How many more payments will be required? Also express the result as xx years, yy months (e.g. finish in 12 yrs, 2 months of payments).
### Amortization

\[
M = \frac{P \times \left(\frac{r}{12}\right)}{1 - \left(1 + \frac{r}{12}\right)^{-n}}.
\]

**Monthly Payment for** \(n\) payments

\[
B_k = P \left(1 + \frac{r}{12}\right)^k + \frac{12M}{r} \left(1 - \left(1 + \frac{r}{12}\right)^k\right)
\]

**Balance after** \(k\) payments

**Number of months required to pay off balance** \(B\) with monthly checks of \(C\):

\[
m = \frac{-\log\left(1 - \frac{Br}{12C}\right)}{\log(1 + r/12)}
\]