COMPOUND INTEREST FORMULAS

Compounded a finite number of times

\[ A = P \left( 1 + \frac{r}{n} \right)^{n\cdot t} \]

Compounded Continuously

\[ A = Pe^{r\cdot t} \]

\(A = \) Amount
\(P = \) Principal
\(r = \) interest rate
\(n = \) # of times compounded
\(t = \) time in years

\(A = \) Amount
\(P = \) Principal
\(r = \) interest rate
\(t = \) time in years
**Compound Interest Sample Problems**

1. If you invest $2500 in an account that pays 12% interest, compounded quarterly, how much would you have at the end of 17 years?

   \[ A = P \left( 1 + \frac{r}{n} \right)^{n \cdot t} \quad \text{or} \quad A = Pe^{rt} \]

   \[ A = \] \hspace{1cm} \[ P = ] \hspace{1cm} \[ r = ] \hspace{1cm} \[ n = ] \hspace{1cm} \[ t = ] \hspace{1cm} \]

2. How much would you have to invest in an account that pays 6% interest, compounded monthly, to have a balance of $30,000 at the end of 10 years?

   \[ A = P \left( 1 + \frac{r}{n} \right)^{n \cdot t} \quad \text{or} \quad A = Pe^{rt} \]

   \[ A = \] \hspace{1cm} \[ P = ] \hspace{1cm} \[ r = ] \hspace{1cm} \[ n = ] \hspace{1cm} \[ t = ] \hspace{1cm} \]

3. How long will it take for an investment of $2,000 in an account that pays \(8 \frac{1}{2}\%\) interest compounded quarterly to become $15,000.

   \[ A = P \left( 1 + \frac{r}{n} \right)^{n \cdot t} \quad \text{or} \quad A = Pe^{rt} \]

   \[ A = \] \hspace{1cm} \[ P = ] \hspace{1cm} \[ r = ] \hspace{1cm} \[ n = ] \hspace{1cm} \[ t = ] \hspace{1cm} \]
4. How long will it take for an amount of money to double if deposited in an account that pays 4.5% interest compounded monthly?

\[ A = P \left(1 + \frac{r}{n}\right)^{n \cdot t} \quad \text{or} \quad A = Pe^{rt} \]

\[
\begin{align*}
A &= \quad \text{final amount} \\
P &= \quad \text{principal} \\
r &= \quad \text{interest rate} \\
n &= \quad \text{number of compounding periods per year} \\
t &= \quad \text{time in years} \\
\end{align*}
\]

5. At what interest rate must you invest $10,000 to have an ending balance of $72,000 at the end of 14 years? (Assume interest is compounded quarterly.)

\[ A = P \left(1 + \frac{r}{n}\right)^{n \cdot t} \quad \text{or} \quad A = Pe^{rt} \]

\[
\begin{align*}
A &= \quad \text{final amount} \\
P &= \quad \text{principal} \\
r &= \quad \text{interest rate} \\
n &= \quad \text{number of compounding periods per year} \\
t &= \quad \text{time in years} \\
\end{align*}
\]

6. If you invest $12,000 in an account that pays 4% interest compounded continuously, how much will you have at the end of 20 years.

\[ A = P \left(1 + \frac{r}{n}\right)^{n \cdot t} \quad \text{or} \quad A = Pe^{rt} \]

\[
\begin{align*}
A &= \quad \text{final amount} \\
P &= \quad \text{principal} \\
r &= \quad \text{interest rate} \\
n &= \quad \text{number of compounding periods per year} \\
t &= \quad \text{time in years} \\
\end{align*}
\]
7. At what interest rate must you invest $5,000 to have an ending balance of $8,000 in 5 years. (Assume interest is compounded continuously.)

\[ A = \]
\[ P = \]
\[ r = \]
\[ n = \]
\[ t = \]

\[ A = P \left(1 + \frac{r}{n}\right)^{n\cdot t} \quad \text{or} \quad A = Pe^{r\cdot t} \]