

Attempt the following problems. You must SHOW ALL WORK and USE CORRECT NOTATION to receive credit. Your work must be organized, legible, and unambiguous. I will not try to interpret what you have written, guess what you really mean, or read what is illegible. You must simplify all of your work unless you are explicitly instructed not to.

Some Useful Formulas:

$I = Prt$	$A = P(1 + rt)$	$A = P \left(1 + \frac{r}{m}\right)^{mt}$
$A = Pe^{rt}$	$r_e = \left(1 + \frac{r}{m}\right)^m - 1$	$r_e = e^r - 1$

1. Solve $\log_3(x-2) + \log_3(x+6) = 2$

$$\begin{aligned} \log_3 [(x-2)(x+6)] &= 2 \\ \log_3 (x^2 + 4x - 12) &= 2 \\ x^2 + 4x - 12 &= 3^2 \\ x^2 + 4x - 12 &= 9 \\ x^2 + 4x - 21 &= 0 \\ (x - 3)(x + 7) &= 0 \end{aligned}$$

$x = 3$
 ~~$x = -7$~~

2. Amy Bellefonte borrowed \$7200 from her father to buy a used car. She repays him after 9 months. Find the total amount that she repays if she is charged 6.2% simple interest.

$$A = P(1 + rt)$$

$$\begin{aligned} A &= ? \\ P &= 7200 \\ r &= .062 \\ t &= 9 \text{ months} = \frac{3}{4} \text{ yr} \end{aligned}$$

$$\begin{aligned} A &= 7200 \left[1 + (.062) \left(\frac{3}{4}\right)\right] \\ &= \boxed{\$7534.80} \end{aligned}$$

3. Chris Lynch plans to invest \$500 into a money market account. If the interest rate is 8% compounded quarterly, determine the value of his investment in 3 years. How much interest did he earn?

$$A = P \left(1 + \frac{r}{m} \right)^{mt}$$

$$\begin{array}{l}
 A = ? \\
 P = 500 \\
 r = .08 \\
 m = 4 \\
 t = 3
 \end{array}
 \left. \vphantom{\begin{array}{l} A = ? \\ P = 500 \\ r = .08 \\ m = 4 \\ t = 3 \end{array}} \right\}
 \begin{array}{l}
 A = 500 \left(1 + \frac{.08}{4} \right)^{(4)(3)} \\
 \boxed{A = \$634.12} \\
 \text{Interest} = 634.12 - 500 \\
 = \boxed{\$134.12}
 \end{array}$$

4. Chris Lynch plans to invest \$500 into a money market account. Find the interest rate that is needed for the money to grow to \$1200 in 14 years if interest is compounded continuously.

$$A = Pe^{rt}$$

$$\begin{array}{l}
 A = 1200 \\
 P = 500 \\
 r = ? \\
 t = 14
 \end{array}
 \left. \vphantom{\begin{array}{l} A = 1200 \\ P = 500 \\ r = ? \\ t = 14 \end{array}} \right\}
 \begin{array}{l}
 1200 = 500 e^{14r} \\
 \frac{12}{5} = e^{14r} \\
 \ln\left(\frac{12}{5}\right) = \ln e^{14r} \\
 \ln\left(\frac{12}{5}\right) = 14r \\
 r = \frac{\ln\left(\frac{12}{5}\right)}{14} = .0625 \\
 = \boxed{6.25\%}
 \end{array}$$