

Precalculus and Limits

1. A certificate of deposit offers an interest rate of 5.5% compounded daily for a term of 4 years. How much would you have to invest initially to have \$25000 when the CD matures?
2. Use the change of base formula to compute the following logarithms. Do not use a calculator — express your answers in terms of $\ln 2$, $\ln 3$, $\ln 5$, and $\ln 7$. For example

$$\log_7 100 = \frac{\ln 100}{\ln 7} = \frac{\ln 10^2}{\ln 7} = \frac{2 \ln 10}{\ln 7} = \frac{2(\ln 2 + \ln 5)}{\ln 7} = \frac{2 \ln 2 + 2 \ln 5}{\ln 7}.$$

(a) $\log_5 36 =$

(c) $\log_{10} \sqrt{75} =$

(b) $\log_{20} 21 =$

(d) $\log_{21} \frac{1}{\sqrt[3]{50}} =$

3. Simplify the following expressions using properties of the natural log function.

(a) $\ln \left(\frac{x^2 + 3x + 1}{5x + 3} \right) =$

(b) $\ln \sqrt[3]{\frac{5xy^3}{x^2 + y^2}} =$

4. Solve the equations.

(a) $3x^2 + 5x - 8 = 0$

(b) $\frac{2x + 1}{x - 2} = \frac{3x + 5}{8 - 2x}$

5. Solve the pairs of equations.

(a) $\begin{cases} 4x + 5y = 7 \\ 3x + 4y = 13 \end{cases}$

(b) $\begin{cases} 3x - 2y = 1 \\ 5x + y = 2 \end{cases}$

(c) $\begin{cases} x^2 + 2x - 3y = -1 \\ 4x + 2y = 14 \end{cases}$

6. Compute the following limits.

(a) $\lim_{x \rightarrow 3} \frac{x^3 - 8}{x - 2} =$

(e) $\lim_{y \rightarrow \infty} \frac{5y^4 + 300y^2 - 60y + 1000}{20000 - 3y + 4y^3 - 0.01y^4} =$

(b) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2} =$

(f) $\lim_{x \rightarrow 0} \frac{\sqrt{4 + x} - 2}{x} =$

(c) $\lim_{x \rightarrow \infty} \frac{x^3 - 8}{x - 2} =$

(g) $\lim_{t \rightarrow 2^+} \frac{t - 2}{\sqrt{t} - 2} =$

(d) $\lim_{h \rightarrow 0} \frac{(x + h)^2 - x^2}{h} =$
(express your answer in terms of x).

(h) $\lim_{x \rightarrow 0^-} \frac{x}{|x|} =$

(i) $\lim_{x \rightarrow 0^+} \frac{x}{|x|} =$

Note: The last 3 limits are one-sided limits.