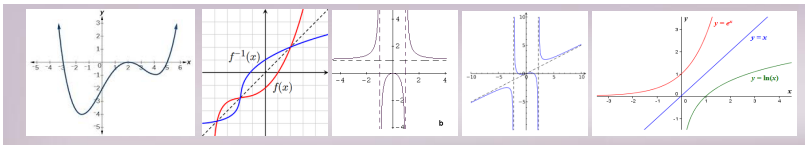


Math 1050 ~ College Algebra

$$-3x+4y=5$$
$$2x-y=-10$$
$$\begin{bmatrix}-3 & 4\\ 2 & -1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}5\\ -10\end{bmatrix}$$

19 Logarithmic Equations and Functions

Learning Objectives

- Determine the domain of a logarithmic function.
- Determine x- and y-intercepts of logarithmic functions.
- Graph logarithmic functions.
- Solve logarithmic equations.
- Solve applications of logarithmic functions.

$$\sum_{k=1}^{m} k=\frac{m(m+1)}{2}$$
$$\sum_{k=0}^{n} z^k=\frac{1-z^{n+1}}{1-z}$$

Determine the Domain of a Logarithmic Function

Remember $\log x$ is only defined for $x > 0$.

Ex 1: Determine the domain of each of these.

a) $f(x) = \log_5 (x+3)$ b) $g(x) = \log (x^2+3)$ c) $h(x) = \ln x - \ln (x+1)$

Solving Logarithmic Equations

Ex 2: We will solve this equation by going through the basic steps.

$\log (5x) + \log (x-1) = 2$

a. Use properties of logs to condense logs into a single log expression on one side of the equation.

b. Exponentiate both sides with the base matching the base of the log.

c. Rewrite as an equivalent exponential equation.

d. Solve and check.

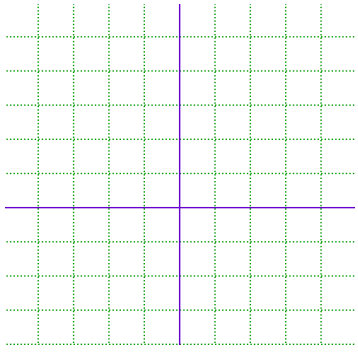
Ex 3: Graph this logarithmic function by following these steps. $f(x) = \ln |x + 1|$

a) Determine the domain.

b) Find the x- and y- intercepts.

c) Determine any asymptotes.

d) Plot a few points and sketch the curve.



Ex 4: Solve for x.

a) $\log_3 x - \log_3(x+1) = 2$

b) $\ln (x+4) - \ln(x-2) = \ln x$

Ex 5: Marilyn is saving for her retirement by depositing $500 per month into an account earning 5.4% annual interest compounded monthly. The time it takes for such an account to grow to be worth S dollars is given by this equation.

$$t = \frac{1}{12}\log_{\left(1+\frac{r}{12}\right)}\left[\frac{Sr}{12P}+1\right]$$

r = annual interest rate

t = time (in years)

P = monthly payments

How many years will she need to keep making these monthly deposits for the account to be worth two million dollars?