

Key

Solve the system of equations.

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

$(2, -1, 3)$

2) Find  $f(-3)$ ,  $f(\frac{1}{2})$ , and  $f(k+1)$  for the following functions.

a.  $f(x) = 3x - 5$       b.  $f(x) = |4x - 1|$       c.  $f(x) = x^2 + x - 3$       d.  $f(x) = \frac{5}{x+3}$

$-14$        $13$        $3$        $\frac{5}{7}$

$-7/2$        $1$        $-3/4$        $10/7$

$3k-2$        $4k+3$        $k^2+3k-1$        $5/k+4$

Graph the following functions. State the Domain and Range for each.

3) a.  $f(x) = \frac{2}{3}x - 5$       b.  $f(x) = |x - 7|$       c.  $f(x) = \sqrt{2x+1}$       d.  $f(x) = x^2$

$D: \mathbb{R}$        $D: (-\infty, \infty)$        $D: [-\frac{1}{2}, \infty)$        $D: (-\infty, \infty)$

$R: (-\infty, \infty)$        $R: [0, \infty)$        $R: [0, \infty)$        $R: [0, \infty)$

e.  $f(x) = 2^x$       f.  $f(x) = \frac{1}{2}^x$       g.  $f(x) = \log_3 x$       h.  $f(x) = \log_{\frac{1}{3}} x$

$D: (-\infty, \infty)$        $D: (-\infty, \infty)$        $D: (0, \infty)$        $D: (0, \infty)$

$R: (0, \infty)$        $R: (0, \infty)$        $R: (-\infty, \infty)$        $R: (-\infty, \infty)$

$\rightarrow$  Same       $\rightarrow$  Same

i.  $f(x) = \frac{5}{x^2+x-12}$  (don't graph this one)

$D: (-\infty, -4) \cup (-4, 3) \cup (3, \infty)$

4) State the vertex, domain, range and y intercept of the quadratic function and graph it.

$f(x) = -3x^2 - 6x + 1$

$\frac{6}{2(-3)} = -1$        $-3+6+1 = 4$        $V(-1, 4)$        $D: (-\infty, \infty)$        $R: (-\infty, 4]$

5) Determine without graphing, whether this function has a minimum or a maximum value. Then find the coordinates of that point.

$f(x) = -2x^2 - 12x - 7$        $\frac{12}{2(-2)} = -3$        $-18+36-7 = 11$        $\max(-3, 11)$

6) You have 180 yards of fencing to enclose a rectangular area. One side of this area will be along the river and will not need fencing. Find the dimensions of the rectangle that maximizes the enclosed area. What is the maximum area?

$A = -2x^2 + 180x$        $\frac{-180}{2(-2)} = 45$

$x = 45 \text{ yd}$        $2x = 90 \text{ yd}$        $4050 \text{ yd}^2$

\* Evaluate the logarithms.

7)  $\log_2 32 = 5$       8)  $\log_{64} 8 = \frac{1}{2}$       9)  $\log_4 \frac{1}{16} = -2$       10)  $\ln 1 = 0$       11)  $\log_7 7 = 1$

12)  $5^{\log_5 \sqrt{x}} = \sqrt{x}$       13)  $\log 10^4 = 4$       14)  $\ln e = 1$       15)  $\ln e^{3x} = 3x$       16)  $\ln \frac{1}{e^5} = -5$

17)  $e^{\ln 3x^2} = 3x^2$       18)  $10^{\log \sqrt[3]{x}} = \sqrt[3]{x}$       19) Find the domain of  $f(x) = \log_3(x+2)$

$(-2, \infty)$

20) Find the difference quotient  $\left(\frac{f(x+h) - f(x)}{h}\right)$  for:  $f(x) = x^2 - 3$

$\frac{x^2 + 2xh + h^2 - 3 - (x^2 - 3)}{h} = 2x + h$