

**Instructions:** You must show all work to receive full credit for the problems below. You may check your work with a calculator, but answers without work will receive minimal credit. Use exact answers unless the problem starts with decimals or you are specifically asked to round.

1. A function is given by  $f(x) = -x^2 - 2x + 3$ . Find the values of  $f(-3)$  and  $f(a+h)$ .

$$f(-3) = -(-3)^2 - 2(-3) + 3 = -9 + 6 + 3 = 0$$

$$f(a+h) = -(a+h)^2 - 2(a+h) + 3 = -a^2 - 2ah - h^2 - 2a - 2h + 3$$

2. Find the slope of the line containing the points  $(-8, 3)$  and  $(4, -3)$ .

$$\frac{3 - (-3)}{-8 - (4)} = \frac{6}{-12} = -\frac{1}{2}$$

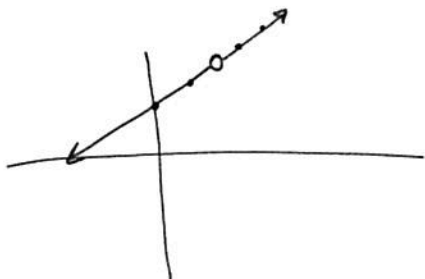
3. Graph  $f(x) = \frac{x^2 - 4}{x - 2}$ . State the domain and range in interval notation. Identify any holes, intercepts, or asymptotes.

$$\frac{(x-2)(x+2)}{x-2} = x+2$$

VA = none

hole at  $x=2$

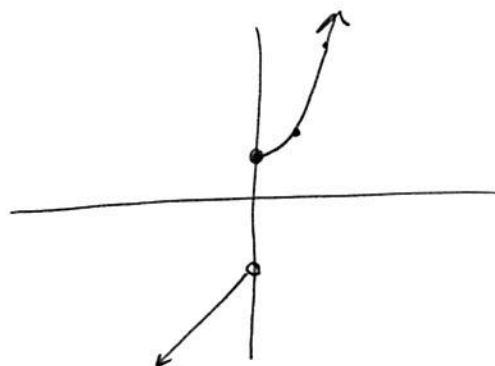
HA = none



Domain:  $(-\infty, 2) \cup (2, \infty)$

Range:  $(-\infty, 4) \cup (4, \infty)$

4. Graph  $f(x) = \begin{cases} x^2 + 1, & \text{for } x \geq 0 \\ x - 2, & \text{for } x < 0 \end{cases}$ .



5. For the function  $f(x, y) = \ln(e^x + 1) + 7xy$ , find  $f(0, -2)$ ,  $f(-2, 1)$ ,  $f(2, 1)$ .

$$f(0, -2) = \ln(e^0 + 1) + 7(0)(-2) = \ln 2$$

$$f(-2, 1) = \ln(e^{-2} + 1) + 7(-2)(1) = \ln\left(1 + \frac{1}{e^2}\right) - 14$$

$$f(2, 1) = \ln(e^2 + 1) + 7(2)(1) = \ln(e^2 + 1) + 14$$

6. State the domain and range of the function  $f(x, y) = \sqrt{x + 2y}$ . Write your domain in set notation, and the range in interval notation.

$$\text{Domain: } \{(x, y) \mid x + 2y \geq 0\}$$

$$\text{Range: } [0, \infty)$$