

# Unit 2 Study Guide

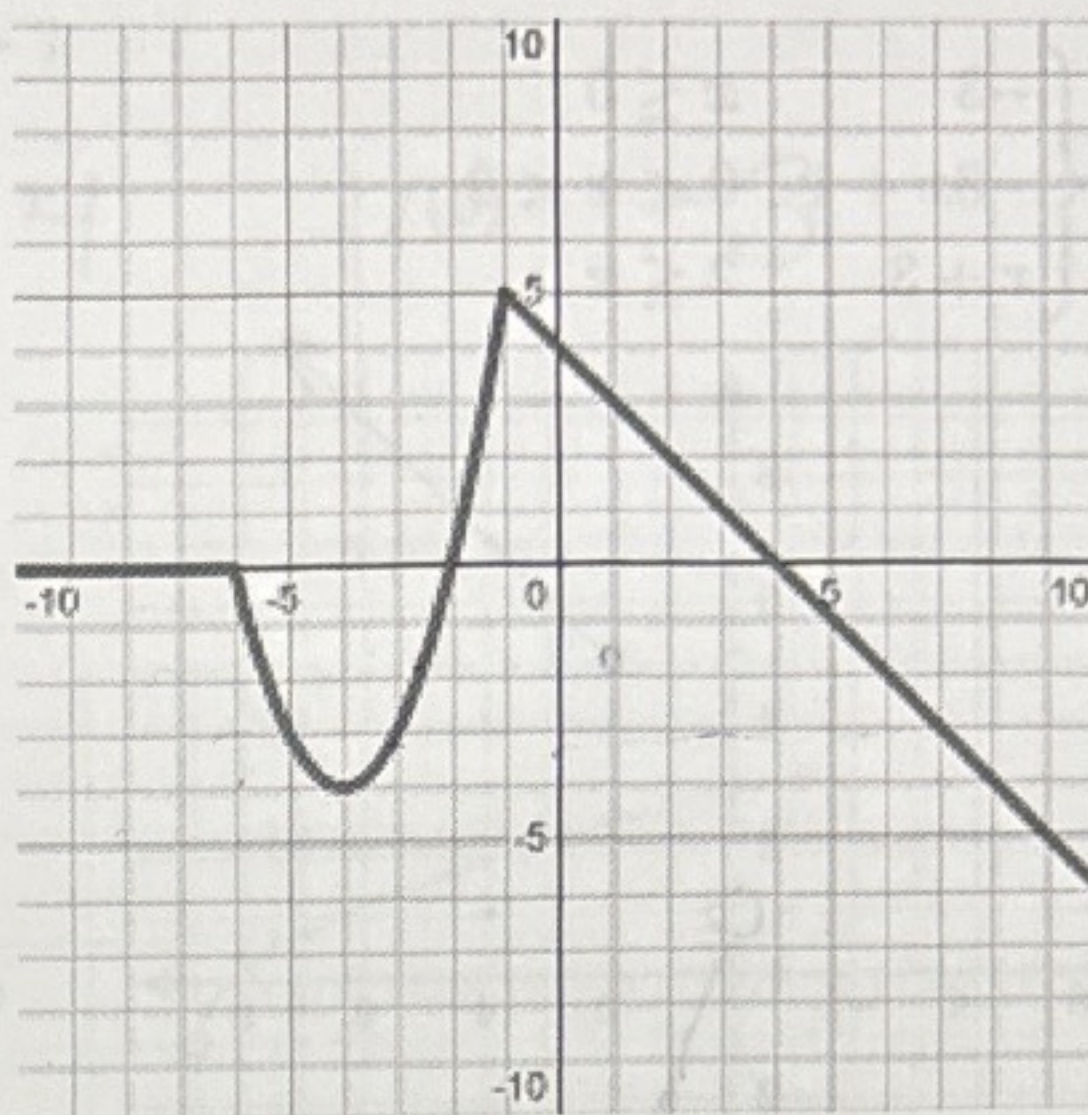
## Function Operations, Composite Functions, Piecewise Functions, and Matrices

$$f(x) = -|x + 2| + 7$$

$$g(x) = (x - 3)^2 - 4$$

x	h(x)
-4	5
-3	0
-2	-3
-1	-4
0	-3
1	0
2	5

j(x) Graph



$$f(5) = 0$$

$$h(x) = -4$$

$$x = -1$$

$$(f+g)(6)$$

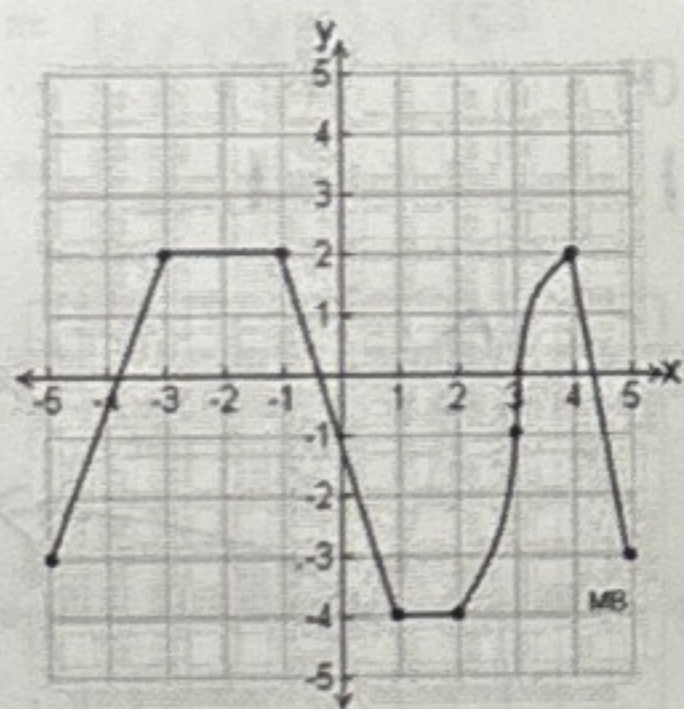
$$-1 + 5 = 4$$

$$f(h(1))$$

$$f(0)$$

$$5$$

$$f(x) =$$



$$g(-7) = 96$$

$$h(x) = 5$$

$$x = 2, -4$$

$$(h-g)(-2)$$

$$-3 - 21 = -24$$

$$j(h(2))$$

$$j(5)$$

$$-1$$

$$h(2) = 5$$

$$j(x) = 0$$

$$x = -9, -8, -7, -6, -2, 4$$

$$(-\infty, -6], -2, -4$$

$$(g/j)(-3)$$

$$32/-3$$

$$g(f(11))$$

$$g(-6)$$

$$77$$

$$g(x) = 4x - 5$$

$$h(x) = x - 8$$

$$j(0) = 4$$

$$j(x) = -3$$

$$x = -5, -3, 7$$

$$(h*j)(-1)$$

$$-4 * 5 = -20$$

$$f(g(11))$$

$$f(60)$$

$$-55$$

$$j(x) = 2x^2 + 3x - 11$$

$$f(g(2))$$

$$f(3)$$

$$-1$$

$$g(f(-5))$$

$$g(-3)$$

$$-17$$

$$j(h(9))$$

$$j(1)$$

$$-6$$

$$j(g(x))$$

$$2(4x-5)^2 + 3(4x-5) - 11$$

$$2(16x^2 - 40x + 25) + 3(4x-5) - 11$$

$$32x^2 - 80x + 50 + 12x - 15 - 11$$

$$32x^2 - 68x + 24$$

$$g(h(x))$$

$$4(x-8) - 5$$

$$4x - 32 - 5$$

$$4x - 37$$

$$h(g(x))$$

$$(4x-5) - 8$$

$$4x - 13$$

$$j(h(x))$$

$$2(x-8)^2 + 3(x-8) - 11$$

$$2(x^2 - 16x + 64) + 3(x-8) - 11$$

$$2x^2 - 32x + 128 + 3x - 24 - 11$$

$$2x^2 - 29x + 93$$

$$g(j(x))$$

$$4(2x^2 + 3x - 11) - 5$$

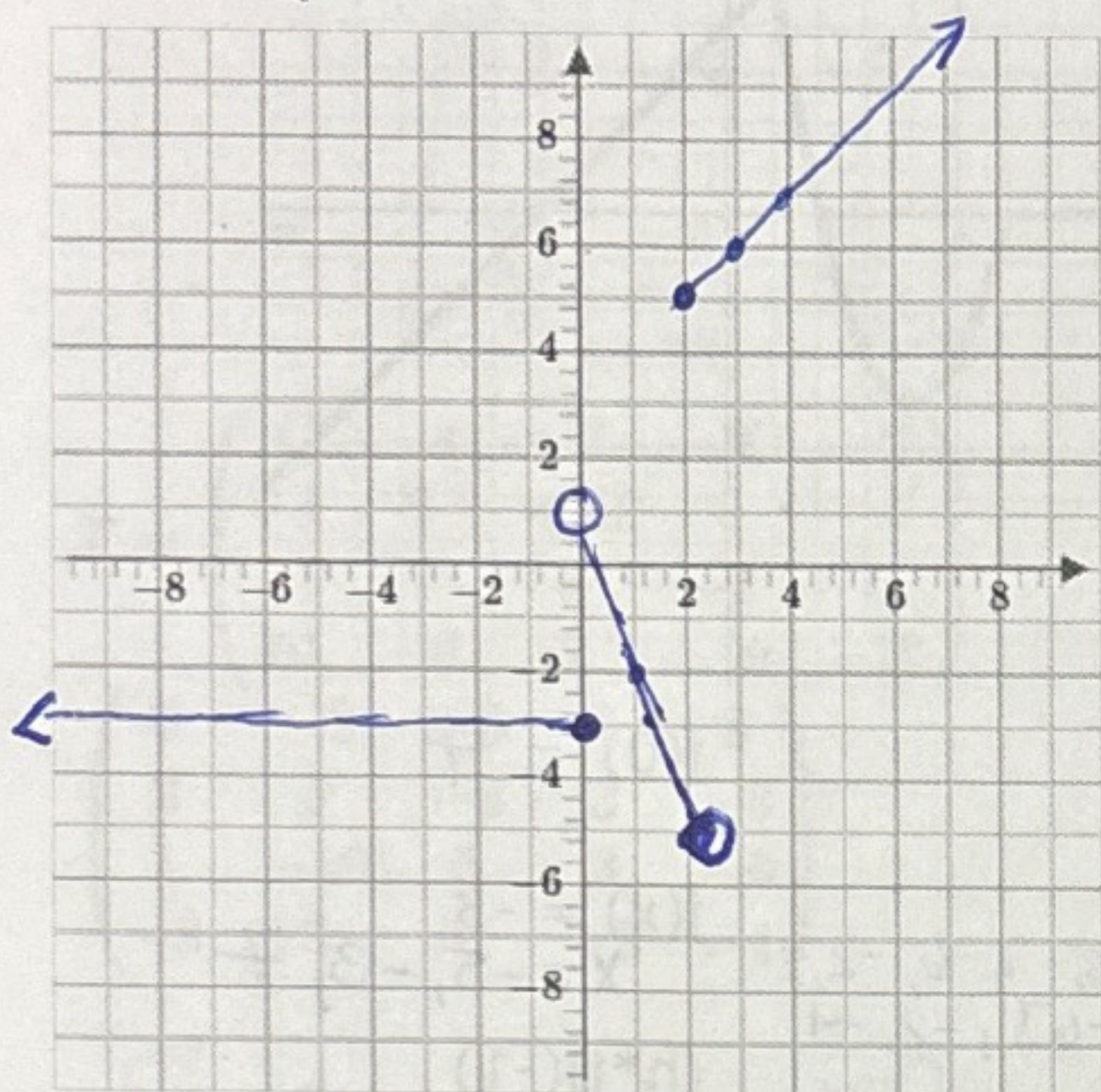
$$8x^2 + 12x - 44 - 5$$

$$8x^2 + 12x - 49$$



Graph each piecewise function below.

$$f(x) = \begin{cases} -3 & x \leq 0 \\ -3x + 1 & 0 < x < 2 \\ x + 3 & 2 \leq x \end{cases}$$

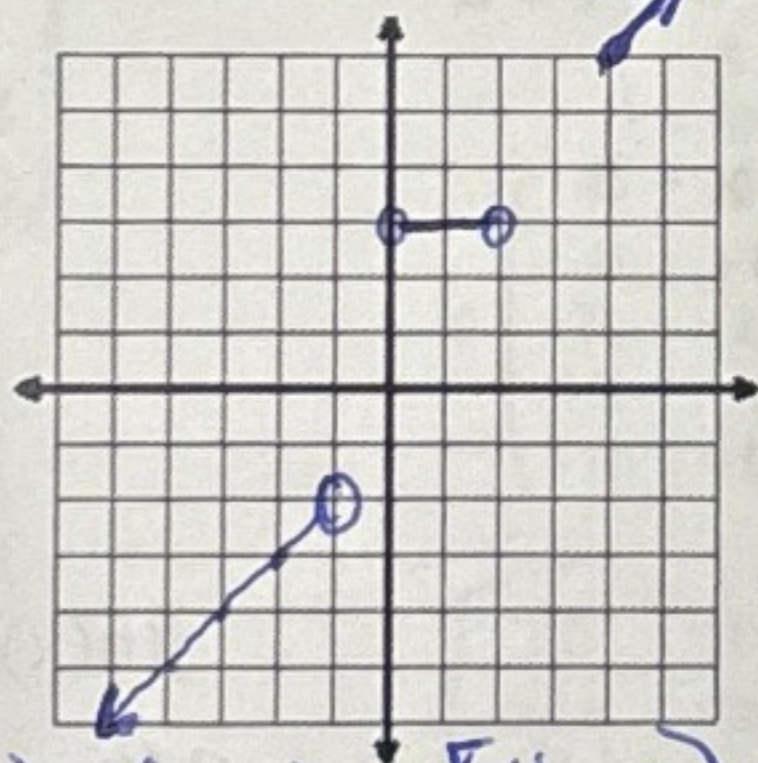


Domain:  $(-\infty, \infty)$

Range:  $(-5, 1) \cup [5, \infty)$

$$\begin{array}{cccc} f(-3) & f(5) & f(1) & f(0) \\ -3 & 8 & -2 & -3 \end{array}$$

$$f(x) = \begin{cases} x-1, & x < -1 \\ 3, & 0 < x < 2 \\ x+2, & x \geq 4 \end{cases}$$

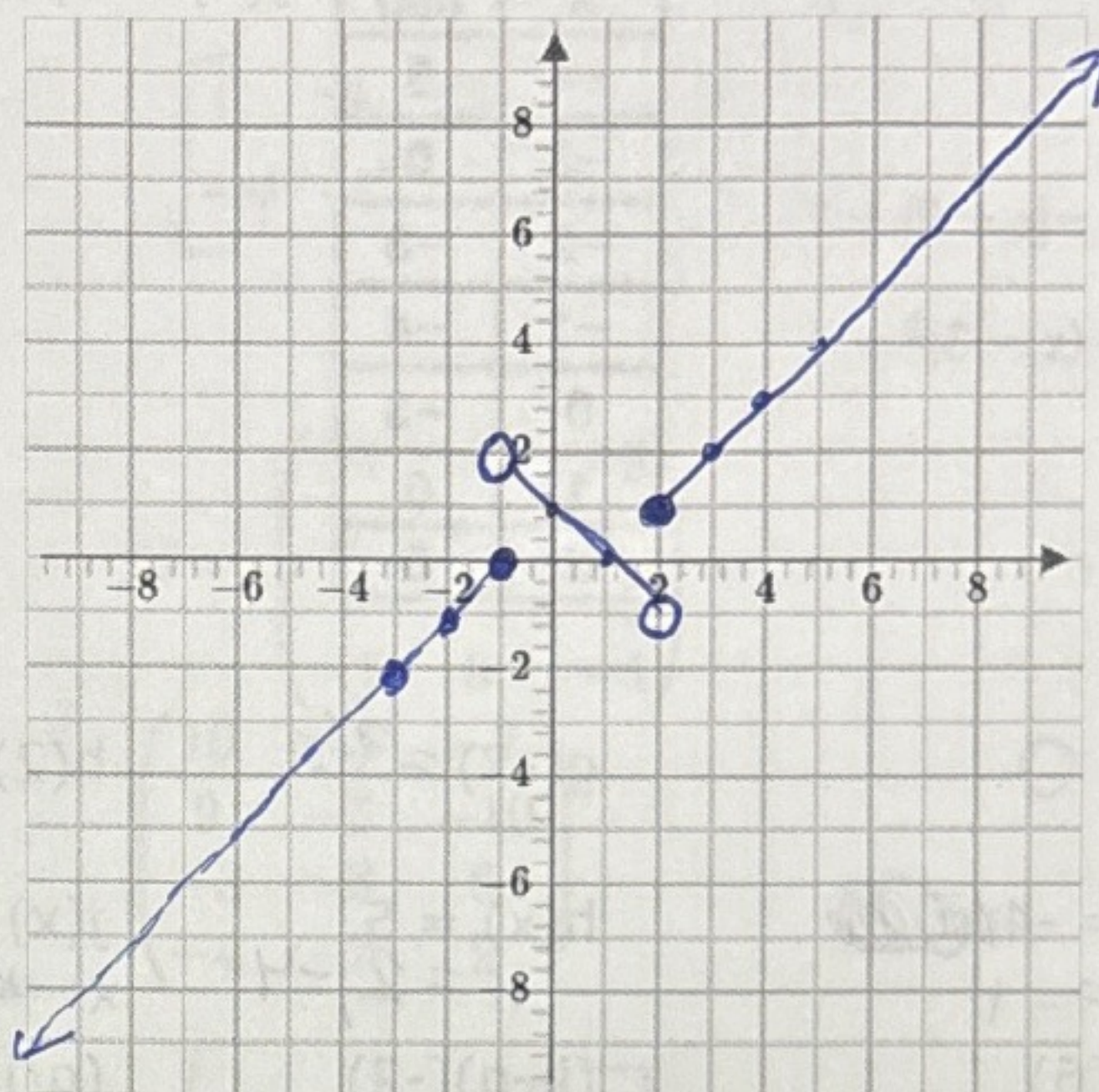


Domain:  $(-\infty, -1) \cup (0, 2) \cup [4, \infty)$

Range:  $(-\infty, -2) \cup (3, 3) \cup [6, \infty)$

$$\begin{array}{ccc} f(-2) & f(1) & f(4) \\ -3 & 3 & 6 \end{array}$$

$$f(x) = \begin{cases} x+1 & x \leq -1 \\ -x+1 & -1 < x < 2 \\ x-1 & 2 \leq x \end{cases}$$

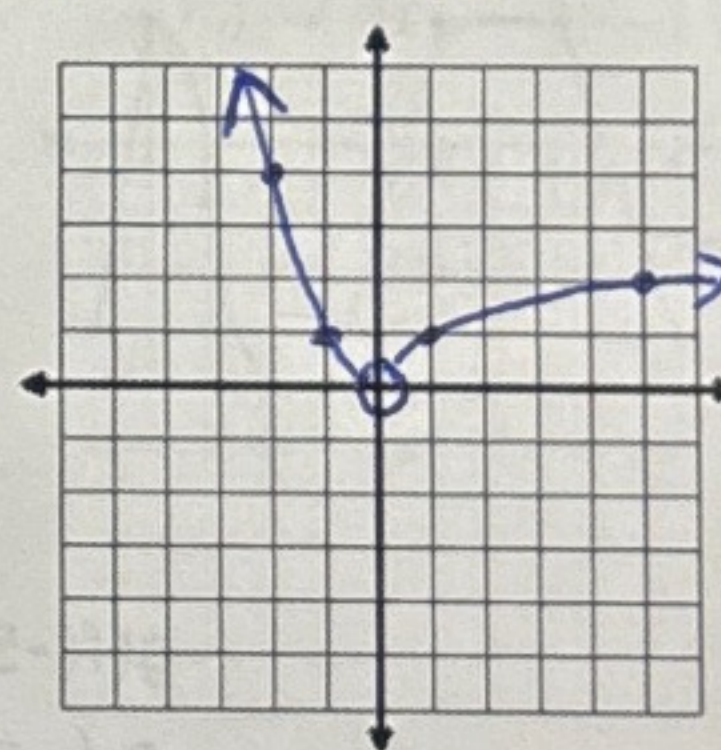


Domain:  $(-\infty, \infty)$

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

$$\begin{array}{cccc} f(-1) & f(0) & f(2) & f(4) \\ 0 & 1 & 1 & 3 \end{array}$$

$$f(x) = \begin{cases} x^2, & x < 0 \\ \sqrt{x}, & x > 0 \end{cases}$$



Domain:  $(-\infty, 0) \cup (0, \infty)$

Range:  $(0, \infty)$

$$\begin{array}{ccc} f(-4) & f(9) & f(1) \\ 16 & 3 & 1 \end{array}$$



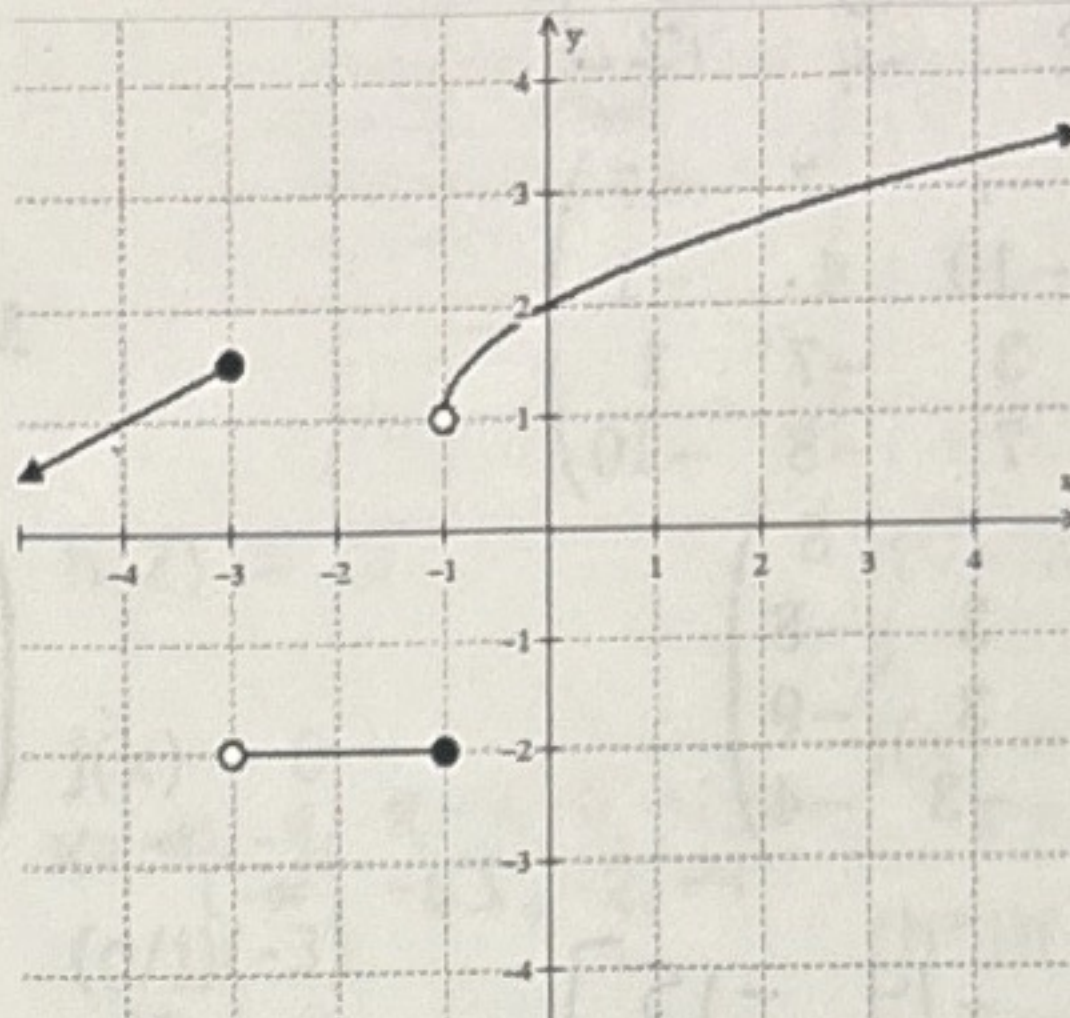
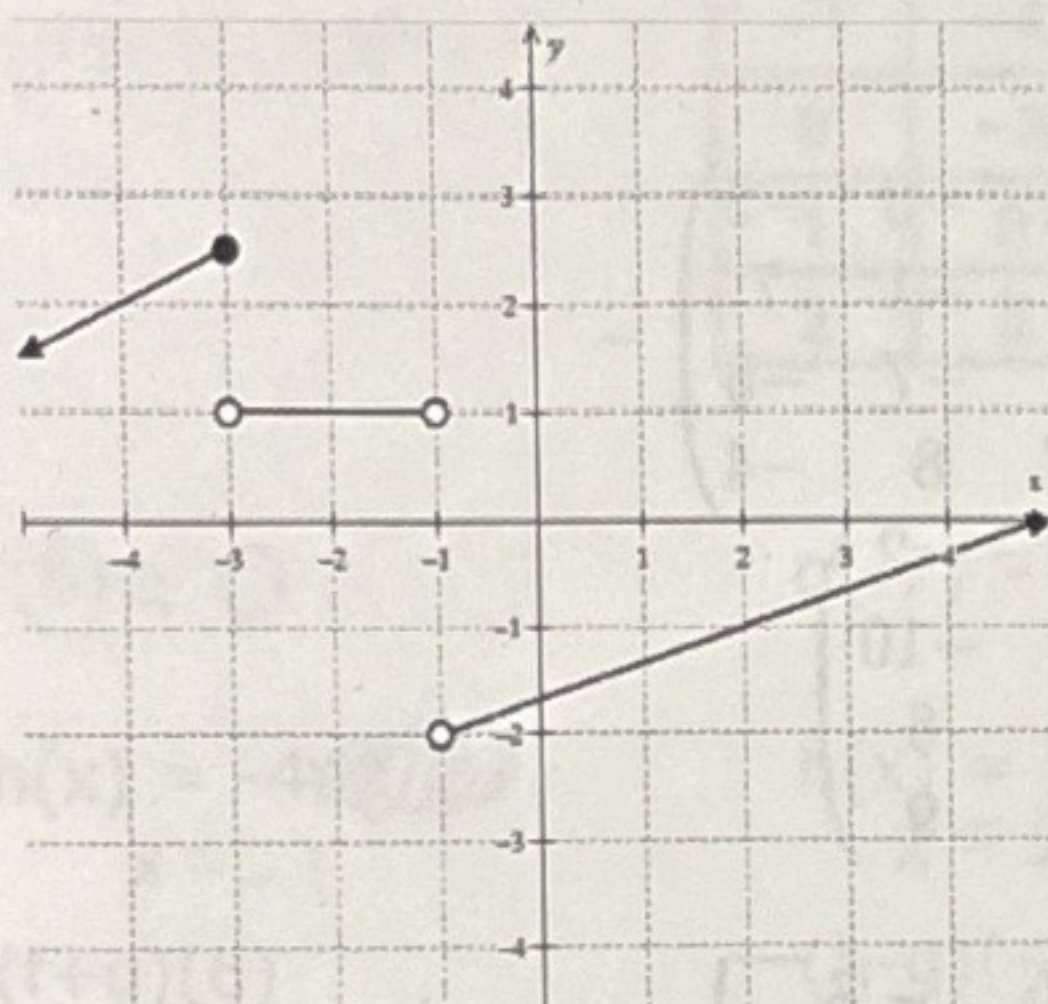
$$f(x) = \begin{cases} 2x+8, & x \leq -2 \\ x^2-3, & -2 < x \leq 3 \\ \sqrt{x+3}, & x > 3 \end{cases}$$

$$f(-4) = 0$$

$$f(6) = 3$$

$$f(-2) = 4$$

$$f(0) = -3$$



$$f(2) = -1$$

$$f(-3) = 2.5$$

$$f(-1) = \text{undefined}$$

$$f(-4) = 2$$

$$f(0) = 2$$

$$f(-4) = 1$$

$$f(-1) = -2$$

$$f(3) = 3$$

Matrices:

Find the dimensions of the following matrix.

$$M = \begin{pmatrix} 2 & -8 \\ 7 & 8 \\ -1 & -7 \\ -9 & -5 \\ -4 & -5 \end{pmatrix}$$

$$5 \times 2$$

Find the value of  $z_{21}$ .

$$Z = \begin{pmatrix} -6 & -5 \\ 4 & 6 \\ 5 & -8 \end{pmatrix}$$

$$4$$

Find the dimensions of the following matrix.

$$X = \begin{pmatrix} 0 & -6 & 5 & -9 \\ 9 & 7 & -8 & -9 \\ -2 & 0 & -4 & -2 \\ 8 & -3 & -5 & 7 \\ 0 & -6 & 4 & 9 \end{pmatrix}$$

$$5 \times 4$$

Find the value of  $q_{21}$ .

$$Q = \begin{pmatrix} 7 & 6 & 5 & 0 & -10 \\ 7 & -7 & 0 & -9 & 0 \\ -7 & -4 & -7 & 0 & 4 \end{pmatrix}$$

$$7$$



$$D = \begin{pmatrix} 6 & -10 & 3 \\ -2 & -8 & 5 \\ 8 & 6 & 1 \\ 2 & -4 & 3 \\ 9 & 5 & 4 \end{pmatrix} + \begin{pmatrix} -9 & -4 & -8 \\ -6 & -6 & -3 \\ -3 & -9 & 10 \\ 4 & -6 & -8 \\ -7 & -9 & 8 \end{pmatrix}$$

$$\begin{bmatrix} -3 & -14 & -5 \\ -8 & -14 & 2 \\ 5 & -3 & 11 \\ 6 & -10 & -5 \\ 2 & -4 & 12 \end{bmatrix}$$

$$C = \begin{pmatrix} 8 & -4 & -8 & -4 & 10 \\ -8 & -9 & -7 & 5 & 7 \\ 3 & 0 & -3 & 0 & -3 \\ -6 & 4 & -7 & -2 & -8 \end{pmatrix} +$$

$$\begin{bmatrix} 11 & -4 & -11 & -4 & 7 \\ -14 & -5 & -14 & 3 & -1 \end{bmatrix}$$

$$T = \begin{pmatrix} 4 & -4 & -7 & -7 & -7 \\ -1 & 5 & -10 & 4 & -1 \\ -7 & 7 & 3 & -7 & 1 \\ 10 & -6 & 7 & -8 & -10 \end{pmatrix} -$$

$$\begin{pmatrix} 0 & -2 & -6 & 7 & 8 \\ 2 & 6 & -8 & 3 & -8 \\ 1 & -10 & 5 & 3 & -9 \\ -8 & 3 & 8 & -3 & -4 \end{pmatrix}$$

$$M = \begin{pmatrix} -1 & -3 & -5 \\ 3 & -1 & 7 \\ 7 & -7 & -5 \\ -7 & 8 & -4 \end{pmatrix} -$$

$$\begin{pmatrix} 10 & -3 & -2 \\ 9 & -3 & -10 \\ -3 & -8 & 6 \\ -4 & -2 & 9 \end{pmatrix}$$

$$\begin{bmatrix} 4 & -2 & -1 & -14 & -15 \\ -3 & -1 & -2 & 1 & 7 \\ -8 & 17 & -2 & -12 & 10 \\ 18 & -9 & -1 & -5 & -6 \end{bmatrix}$$

$$\begin{bmatrix} -11 & 0 & -3 \\ -6 & 2 & 17 \\ 10 & 1 & -11 \\ -3 & 10 & -13 \end{bmatrix}$$

$$Q = -7 \begin{pmatrix} 10 & 0 \\ -6 & -1 \\ 5 & 3 \\ -3 & -3 \\ -5 & -6 \end{pmatrix}$$

$$R = 4 \begin{pmatrix} -7 & -10 & -8 & 10 \\ 2 & 1 & 4 & 0 \\ 8 & 8 & -1 & -5 \\ -8 & -7 & 1 & -2 \\ -10 & -9 & -2 & 0 \end{pmatrix} +$$

$$9 \begin{pmatrix} 6 & 9 & 8 & 7 \\ -8 & -9 & -6 & -4 \\ 7 & 2 & -10 & -7 \\ -8 & -5 & 1 & -1 \\ -10 & -10 & -1 & -1 \end{pmatrix}$$

$$X = \begin{pmatrix} 5 & 6 & -7 & 0 \\ -10 & 5 & 3 & -8 \end{pmatrix} \begin{pmatrix} -5 & -4 \\ 9 & -4 \\ 2 & -9 \\ -4 & 9 \end{pmatrix}$$

$$\begin{bmatrix} 15 & 19 \\ 133 & -79 \end{bmatrix}$$

$$\begin{bmatrix} -70 & 0 \\ 42 & 7 \\ -35 & -21 \\ 21 & 21 \\ 35 & 42 \end{bmatrix}$$

$$\begin{bmatrix} 26 & 41 & 40 & 103 \\ -64 & -77 & -38 & -36 \\ 95 & 50 & -94 & -83 \\ -104 & -73 & 13 & -17 \\ -130 & -126 & -17 & -9 \end{bmatrix}$$

$$Y = (-7 \ 2 \ -10) \begin{pmatrix} 0 & -9 & -7 & 9 \\ 9 & -1 & 2 & 4 \\ -3 & 1 & -10 & -4 \end{pmatrix}$$

$$\begin{bmatrix} 48 & 51 & 153 & -15 \end{bmatrix}$$

Let  $M$  be a 2 by 6 matrix, and let  $N$  be a 6 by 4 matrix. Choose all of the operations which make sense.

☐  $M + N$

☐  $M - N$

☒  $MN$

☐  $NM$

Let  $A$  be a 4 by 2 matrix, and let  $B$  be a 2 by 7 matrix. What are the dimensions of  $AB$ ?

4 x 7