

Review – Transformation of Functions

1. Expand and simplify the expressions given:

$$f(x) = 3x^2 + 5x - 1$$

$$g(x) = 2x - 1$$

a) $f(3)$

$$\begin{aligned} f(3) &= 3(3)^2 + 5(3) - 1 \\ &= 27 + 15 - 1 \\ &= 41 \end{aligned}$$

b) $g(2x - 3)$

$$\begin{aligned} g(2x-3) &= 2(2x-3) - 1 \\ &= 4x - 6 - 1 \\ &= 4x - 7 \end{aligned}$$

c) $g(f(x))$

$$\begin{aligned} g(f(x)) &= 2[3x^2 + 5x - 1] - 1 \\ &= 6x^2 + 10x - 2 - 1 \\ &= 6x^2 + 10x - 3 \end{aligned}$$

d) $y = 2f(x+1) - 4$

$$\begin{aligned} y &= 2[3(x+1)^2 + 5(x+1) - 1] - 4 \\ &= 2[3(x+1)(x+1) + 5x + 5 - 1] - 4 \\ &= 2[3(x^2 + 2x + 1) + 5x + 4] - 4 \\ &= 2[3x^2 + 6x + 3 + 5x + 4] - 4 \\ &= 2[3x^2 + 11x + 7] - 4 \\ &= 6x^2 + 22x + 14 - 4 \\ &= 6x^2 + 22x + 10 \end{aligned}$$

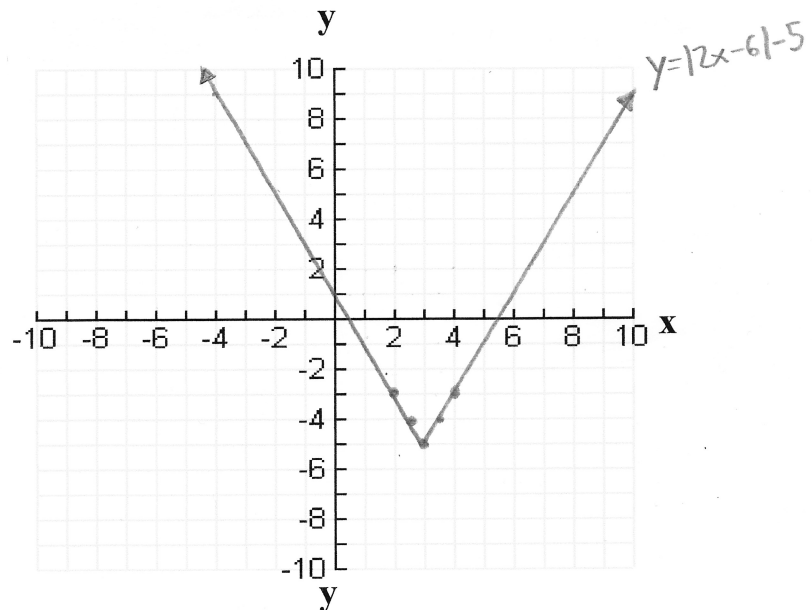
2. Graph the following relations and determine the domain and range.

a)

$$\begin{aligned} y &= |2x - 6| - 5 \\ y &= |2(x-3)| - 5 \\ k &= 2 \\ d &= 3 \\ a &= 1 \\ c &= -5 \end{aligned}$$

$$\begin{aligned} \text{Domain} &= \{x \in \mathbb{R}\} \\ \text{Range} &= \{y \in \mathbb{R} \mid y \geq -5\} \end{aligned}$$

x	y = x
-2	2
-1	1
0	0
1	1
2	2

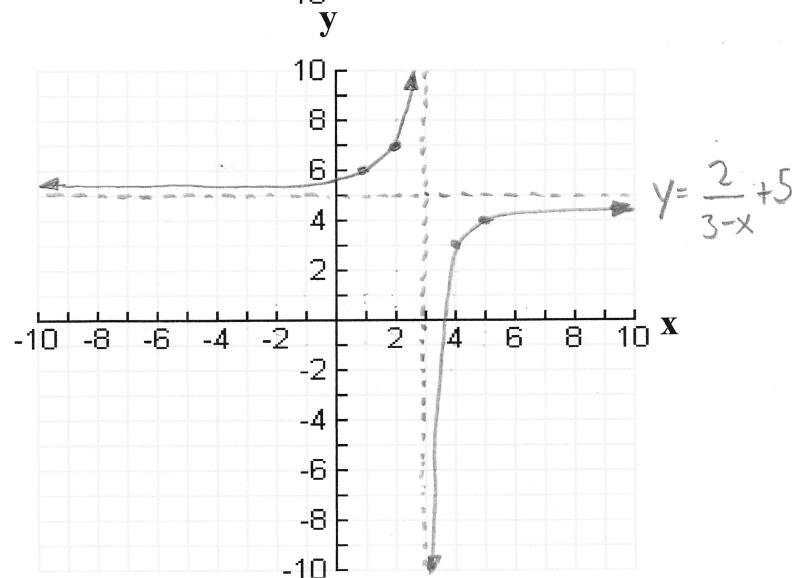


b)

$$\begin{aligned} y &= \frac{2}{3-x} + 5 \\ y &= 2 \frac{1}{-x+3} + 5 \\ y &= 2 \frac{1}{-1(x-3)} + 5 \\ k &= -1 \\ d &= 3 \\ a &= 2 \\ c &= 5 \end{aligned}$$

$$\begin{aligned} \text{Domain} &= \{x \in \mathbb{R} \mid x \neq 3\} \\ \text{Range} &= \{y \in \mathbb{R} \mid y \neq 5\} \end{aligned}$$

x	y = 1/x
-2	-0.5
-1	-1
0	DNE
1	1
2	0.5

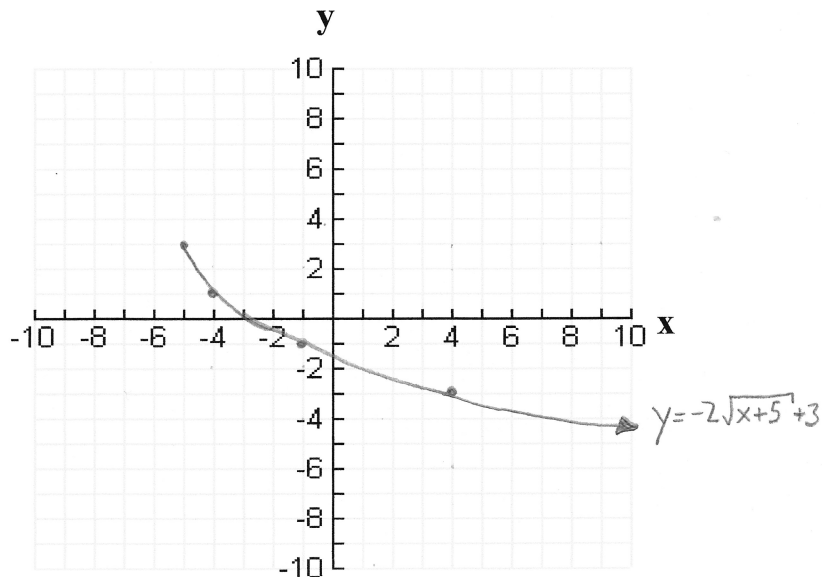


c) $y = -2\sqrt{x+5} + 3$

x	$y = \sqrt{x}$
0	0
1	1
4	2
9	3

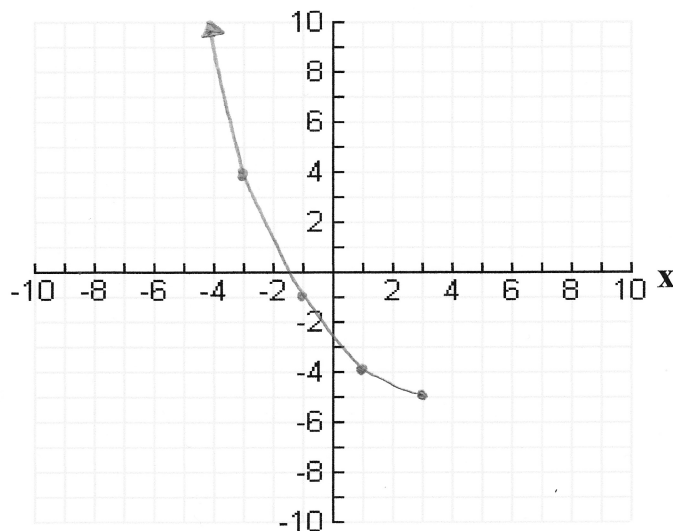
$k = 1$
 $d = -5$
 $a = -2$
 $c = 3$

Domain = $\{x \in \mathbb{R} \mid x \geq -5\}$
 Range = $\{y \in \mathbb{R} \mid y \leq 3\}$



d) The inverse of
 $y = -2\sqrt{x+5} + 3$

Domain = $\{x \in \mathbb{R} \mid x \leq 3\}$
 Range = $\{y \in \mathbb{R} \mid y \geq -5\}$



3. Determine the inverse of each relation below.

a) $y = 4(x-1)^2 - 8$

$x = 4(y-1)^2 - 8$

$\frac{x+8}{4} = \frac{4(y-1)^2}{4}$

$\pm \sqrt{\frac{x+8}{4}} = \sqrt{(y-1)^2}$

$y = \pm \sqrt{\frac{x+8}{4}} + 1$

b) $y = 2x + 4$

$x = 2y + 4$

$\frac{x-4}{2} = \frac{2y}{2}$

$y = \frac{x-4}{2}$

c) $y = \frac{3}{2x-6}$

$x = \frac{3}{2y-6}$

$x(2y-6) = 3$

$2xy - 6x = 3$

$\frac{2xy}{2x} = \frac{3+6x}{2x}$

$y = \frac{3+6x}{2x}$

Practice: Pg 76 # 1bcd, 2bcef, 4ae, 5a, 8, 10, 13b, 16