

Name: _____
PC

Date: _____
Ms. Loughran

Do Now: $f(x) = a(x-h)^2 + k$

1. Graph $f(x) = -x^2 - 2x + 1$. Then find its:

- (a) vertex $(-1, 2)$
- (b) axis of symmetry $x = -1$
- (c) domain $(-\infty, \infty)$
- (d) range $(-\infty, 2]$
- (e) x-intercepts $(-1 \pm \sqrt{2}, 0)$
- (f) y-intercept $(0, 1)$

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

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

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

x-int: (let $y = 0$)

$$0 = -(x+1)^2 + 2$$

$$-2 = -(x+1)^2$$

$$2 = (x+1)^2$$

$$\pm\sqrt{2} = x+1$$

$$x = -1 \pm \sqrt{2}$$

y-int: (let $x = 0$)

$$y = -(0+1)^2 + 2$$

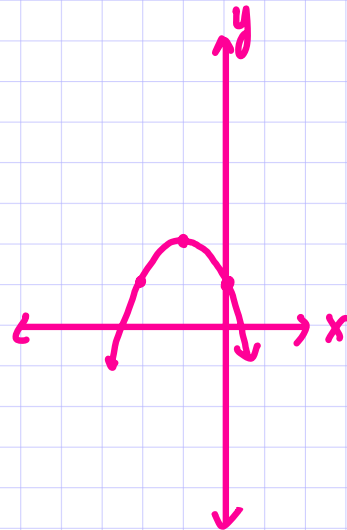
$$y = 1$$

left 1, reflect over x \uparrow 2

$$(-1, 1) \quad (-2, 1) \quad (-2, -1) \quad (-2, 1)$$

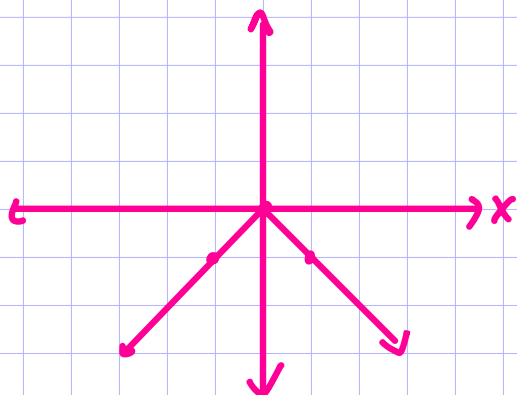
$$(0, 0) \quad (-1, 0) \quad (-1, 0) \quad (-1, 2)$$

$$(1, 1) \quad (0, 1) \quad (0, -1) \quad (0, 1)$$



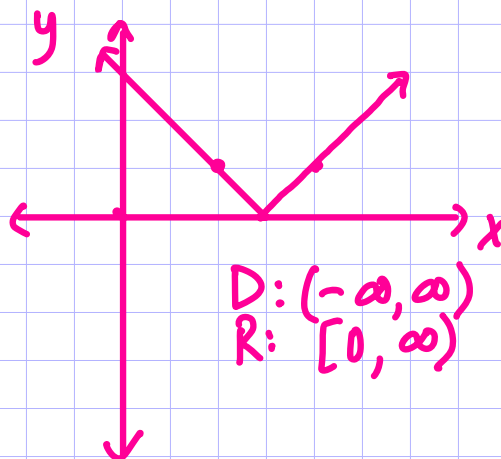
1. Graph each function as a transformation of the basic function $y = |x|$. State the domain and range of each.

(a) $y = -|x|$ reflection over x-axis



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

(b) $y = |3-x| = |x-3|$ right 3

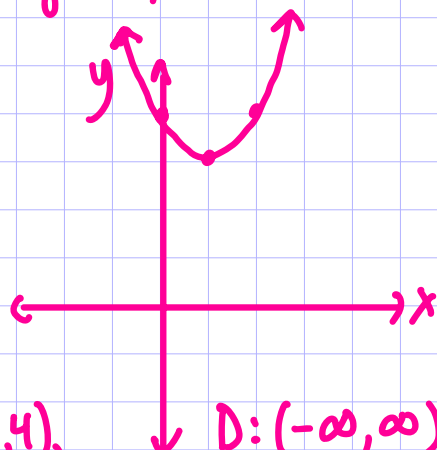


D: $(-\infty, \infty)$
R: $[0, \infty)$

2. Graph each function as a transformation of the basic function $y = x^2$. State the domain and range of each.

(g) $y = (x-1)^2 + 3$

right 1, up 3



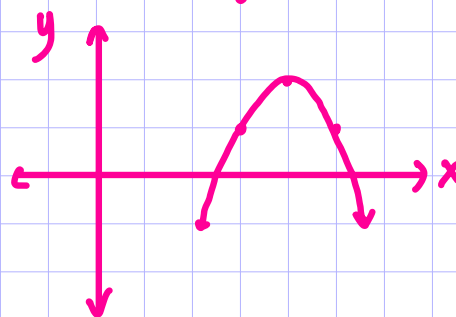
right 1 up 3

$(-1, 1)$	$(0, 1)$	$(0, 4)$
$(0, 0)$	$(1, 0)$	$(1, 3)$
$(1, 1)$	$(2, 1)$	$(2, 4)$

D: $(-\infty, \infty)$
R: $[3, \infty)$

(h) $y = 2 - (x-4)^2 = -(x-4)^2 + 2$

right 4, reflected over x, up 2



right 4 reflect over x up 2

$(-1, 1)$	$(3, 1)$	$(3, -1)$	$(3, 1)$
$(0, 0)$	$(4, 0)$	$(4, 0)$	$(4, 2)$
$(1, 1)$	$(5, 1)$	$(5, -1)$	$(5, 1)$

D: $(-\infty, \infty)$
R: $(-\infty, 2]$

$$y = a(x-h)^2 + k$$

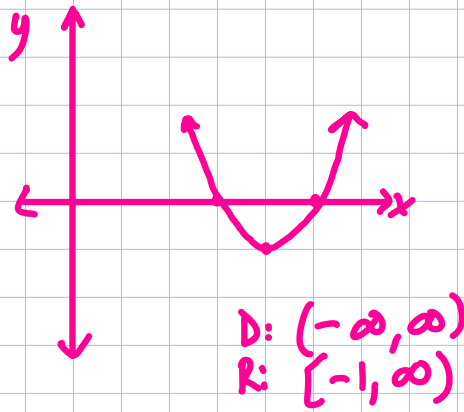
(k) $y = x^2 - 8x + 15$

$$y = x^2 - 8x + 16 - 16 + 15$$

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

right 4, ↓ 1

$(-1, 1)$	$(3, 1)$	$(3, 0)$
$(0, 0)$	$(4, 0)$	$(4, -1)$
$(1, 1)$	$(5, 1)$	$(5, 0)$



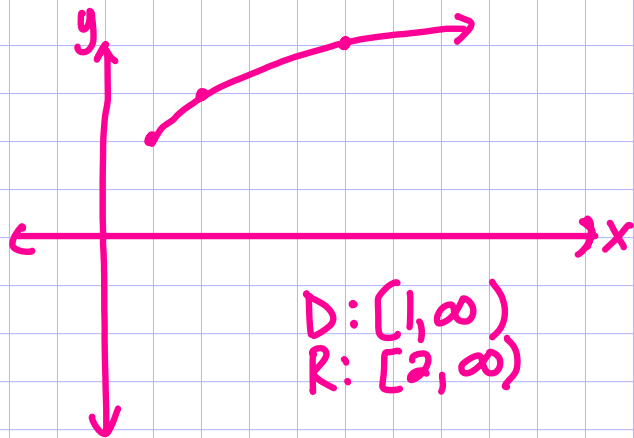
3. Graph each function as a transformation of the basic function $y = \sqrt{x}$. State the domain and range of each.

(b) $y = \sqrt{x-1} + 2$

right 1, ↑ 2

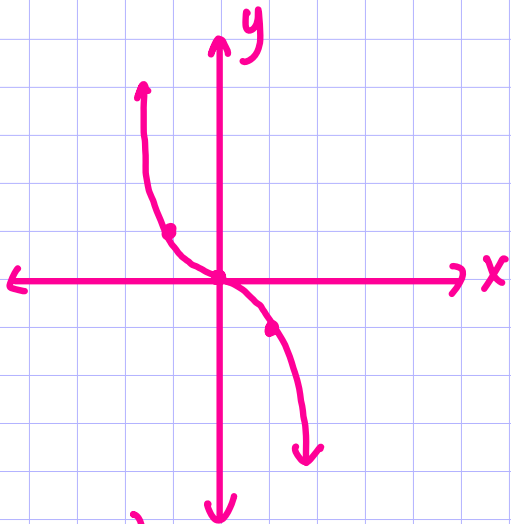
right 1 ↑ 2

$(0, 0)$	$(1, 0)$	$(1, 2)$
$(1, 1)$	$(2, 1)$	$(2, 3)$
$(4, 2)$	$(5, 2)$	$(5, 4)$



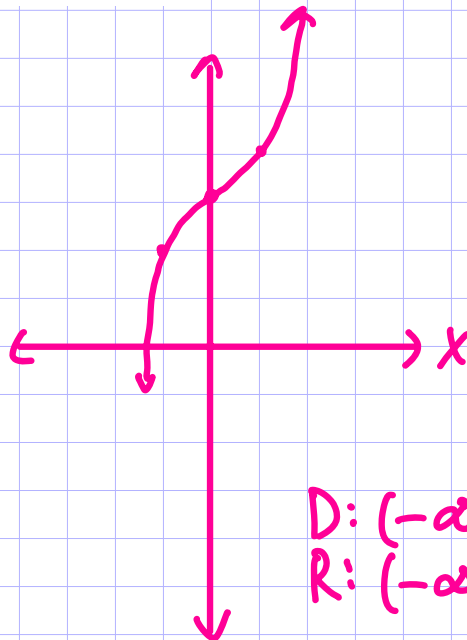
4. Graph each function as a transformation of the basic function $y = x^3$. State the domain and range of each.

(a) $y = -x^3$ reflect over x



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

(b) $y = x^3 + 3$ ↑ 3

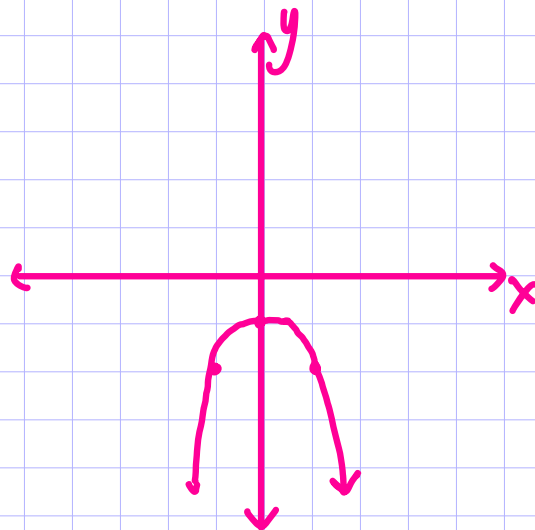


D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

5. Graph each function as a transformation of the basic function $y = x^4$. State the domain and range of each.

(b) $y = -x^4 - 1$ reflect over x ↓ 1

$(-1, 1)$	$(-1, -1)$	$(-1, -2)$
$(0, 0)$	$(0, 0)$	$(0, -1)$
$(1, 1)$	$(1, -1)$	$(1, -2)$



D: $(-\infty, \infty)$
R: $(-\infty, -1]$

Name: _____
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1. Graph each function as a transformation of the basic function $y = |x|$. State the domain and range of each.

(a) $y = -|x|$

(c) $y = 3 - |x|$

(b) $y = |3 - x|$

(d) $y = |x + 2| - 1$

2. Graph each function as a transformation of the basic function $y = x^2$. State the domain and range of each.

(a) $y = x^2 - 2$

(i) $y = x^2 + 6x + 9$

(b) $y = (x - 2)^2$

(j) $y = x^2 + 4x$

(c) $y = (x + 2)^2$

(k) $y = x^2 - 8x + 15$

(d) $y = (-x)^2$

(l) $y = x^2 - 2x - 6$

(e) $y = -x^2$

(m) $y = x^2 + 6x + 10$

(f) $y = -(x + 1)^2$

(n) $y = x^2 + 14x + 40$

(g) $y = (x - 1)^2 + 3$

(h) $y = 2 - (x - 4)^2$

3. Graph each function as a transformation of the basic function $y = \sqrt{x}$. State the domain and range of each.

(a) $y = \sqrt{x} + 1$

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

(b) $y = \sqrt{x - 1} + 2$

(d) $y = -\sqrt{x + 3} - 1$

4. Graph each function as a transformation of the basic function $y = x^3$. State the domain and range of each.

(a) $y = -x^3$

(c) $y = (x - 5)^3$

(b) $y = x^3 + 3$

(d) $y = (-x)^3$

5. Graph each function as a transformation of the basic function $y = x^4$. State the domain and range of each.

(a) $y = x^4 + 1$

(c) $y = (x - 4)^4$

(b) $y = -x^4 - 1$

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

Homework 11-15

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PC: Transformations

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Given each original function, *describe* each transformation in terms of the original function.

1. $y = x^2$

- (a) $y = x^2 - 2$ ↓ 2
- (b) $y = (x-2)^2$ right 2
- (c) $y = x^2 + 2$ ↑ 2
- (d) $y = (x+2)^2$ left 2
- (e) $y = (-x)^2$ reflection over y-axis
- (f) $y = -x^2$ reflection over x-axis
- (g) $y = -(x+1)^2$ left one, reflection over x-axis
- (h) $y = (x-1)^2 + 3$ right one ↑ 3
- (i) $y = (x+3)^2 - 1$ left 3 ↓ 1

(j) $y = 2 - (x-4)^2$

(j) $y = -(x-4)^2 + 2$
right 4, reflect over x-axis ↑ 2

3. $y = \sqrt{x}$

- (a) $y = \sqrt{x-1}$ right 1
- (b) $y = \sqrt{x} + 2$ ↑ 2
- (c) $y = \sqrt{x+2}$ left 2
- (d) $y = -\sqrt{x}$ reflect over x-axis
- (e) $y = -\sqrt{x+1}$ left 1, reflect over x-axis
- (f) $y = \sqrt{x} - 3$ ↓ 3
- (g) $y = -\sqrt{x} + 2$ reflect over x-axis ↑ 2
- (h) $y = -\sqrt{x-3} + 1$ right 3, reflect over x-axis, ↑ 1
- (i) $y = -4 - \sqrt{x} = -\sqrt{x} - 4$ reflect over x-axis, ↓ 4
- (j) $y = \sqrt{x-1} + 2$ right 1, ↑ 2

4. $y = x^3$

- (a) $y = (x-1)^3$ right 1
- (b) $y = x^3 - 4$ ↓ 4
- (c) $y = -x^3$ reflect over x-axis
- (d) $y = -(x+2)^3$ left 2, reflect over x-axis
- (e) $y = (-x)^3$ reflect over y-axis
- (f) $y = 2 + x^3 = x^3 + 2$ ↑ 2
- (g) $y = -4 - x^3 = -x^3 - 4$ reflect over x-axis, ↓ 4