

4.7 Polynomial Functions and their Transformations

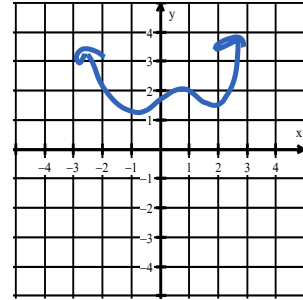
OBJ: To identify, write, and graph polynomial functions

1.) Review: Find the zeroes and graph $x^4 + 7x^2 + 12 = 0$.

$$(x^2 + 4)(x^2 + 3) = 0$$

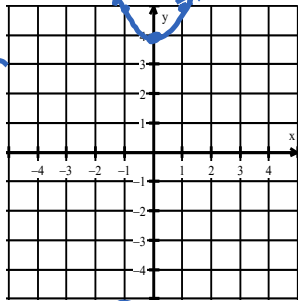
$$x^2 + 4 = 0 \implies x^2 = -4 \implies x = \pm 2i$$

$$x^2 + 3 = 0 \implies x^2 = -3 \implies x = \pm i\sqrt{3}$$



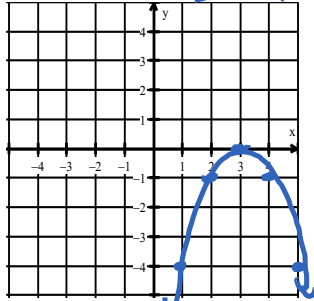
Graph each transformation of the parent quadratic function. Then find the following information.

2. $y = x^2 + 4$



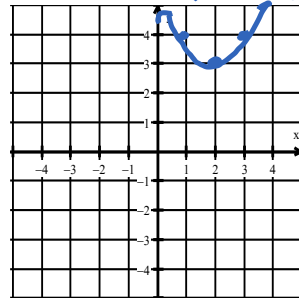
Domain: \mathbb{R}
Range: $y \geq 4$

3. $y = -(x - 3)^2$ *Reflect x-axis*



Domain: \mathbb{R}
Range: $y \leq 0$

4. $y = (x - 2)^2 + 3$



Domain: \mathbb{R}
Range: $y \geq 3$

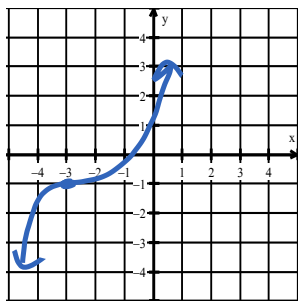
Transformations of Polynomial Functions $y=f(x)$

Vertex Form

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

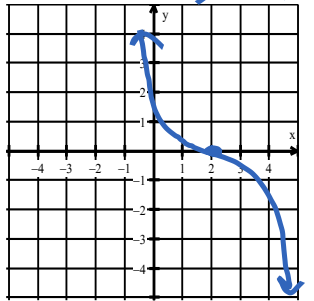
$a < 0$ → reflects through x-axis
 $+h$ → Left
 $-h$ → Right
 $+k$ → Up
 $-k$ → Down

5. $y = (x + 3)^3 - 1$



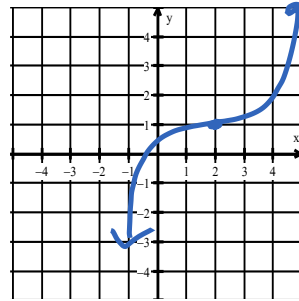
Domain: \mathbb{R}
Range: \mathbb{R}

6. $y = -(x - 2)^3$ *Reflect x-axis*



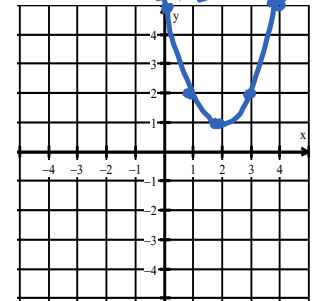
Domain: \mathbb{R}
Range: \mathbb{R}

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



Domain: \mathbb{R}
Range: \mathbb{R}

8. $y = (x - 2)^2 + 1$



Domain: \mathbb{R}
Range: $y \geq 1$

8. If $y=x^3$ is the parent function, explain how each graph would be shifted or reflected.

a) $y = -x^3$

Reflect through x-axis

b) $y = (x - 1)^3$

Right 1

c) $y = x^3 + 3$

Up 3

d) $y = (x + 8)^3 - 13$

Left 8
Down 13

9. Write an expression that represents the parent function $y = x^4$ being shifted in the following ways:

a) Down 8

$y = x^4 - 8$

b) Reflect through x-axis

$y = -x^4$

c) Right 3 units

$y = (x - 3)^4$

d) Left 2, Up 1

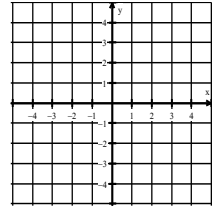
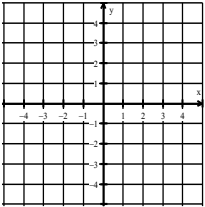
$y = (x + 2)^4 + 1$

4.7 Transformations of Poly. Functions HW

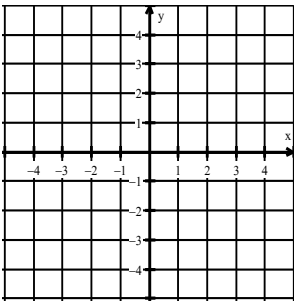
Name _____

1. Find the zeroes and graph $y = x^4 + 3x^2 - 4$.

2. Find the zeroes and graph $2x^3 - 3x^2 - 18x - 8 = 0$.

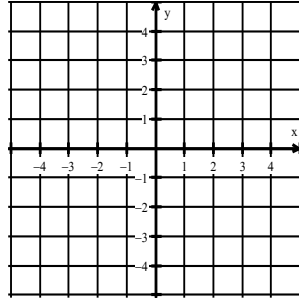


3. $y = (x + 2)^3 - 1$



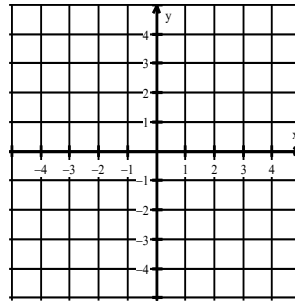
Domain: _____ Range: _____

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



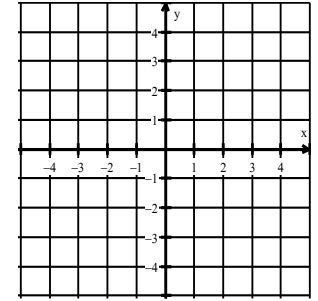
Domain: _____ Range: _____

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



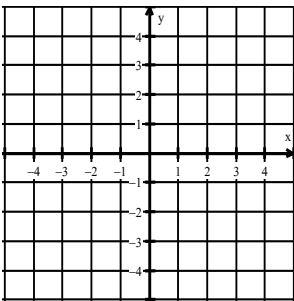
Domain: _____ Range: _____

6.) $y = (x - 3)^2 - 3$



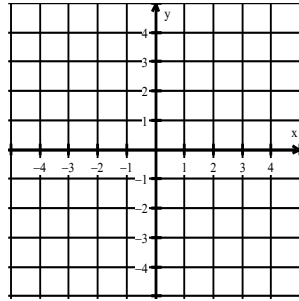
Domain: _____ Range: _____

7. $y = -(x - 4)^3 - 2$



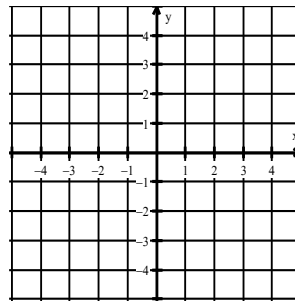
Domain: _____ Range: _____

8.) $y = (x - 1)^3$



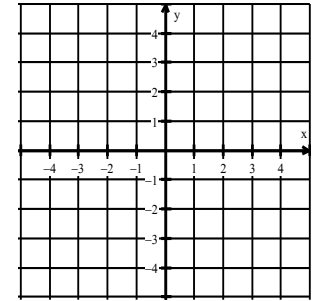
Domain: _____ Range: _____

9.) $y = (x - 5)^3 + 2$



Domain: _____ Range: _____

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



Domain: _____ Range: _____

11. If $y=x^4$ is the absolute value parent function, explain how each graph would be shifted or reflected.

- a) $y = -x^4$ b) $y = (x + 9)^4$ c) $y = x^4 - 7$ d) $y = (x - 3)^4 + 20$

12. Write an expression that represents the parent function $y = x^3$ being shifted in the following ways:

- a) Up 2 b) Reflect through x-axis c) Left 6 units d) Right 5, Down 2

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OBJ: To identify, write, and graph polynomial functions

Warm-Up

Find the zeroes and graph

$$x^4 + 7x^2 + 12 = 0.$$

