

Review

Unit 1

Domain ✓

Graphing Parent Functions ✓

Inverses ✓

Unit 2

Degree/End Behavior ✓

Sketching Polynomials ✓

Polynomial Division ✓

Unit 3

Factoring

Finding Zeros

Domain

- ① Fractions
- ② Square Roots

Find the domain of the following functions.

①

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

$$\boxed{x \neq -2}$$

②

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

$$1 - 2x \geq 0$$

$$1 \geq 2x$$

$$\boxed{\frac{1}{2} \geq x}$$

③

$$y = x^2 - 5x + 4$$

$$\boxed{\mathbb{R}}$$

④

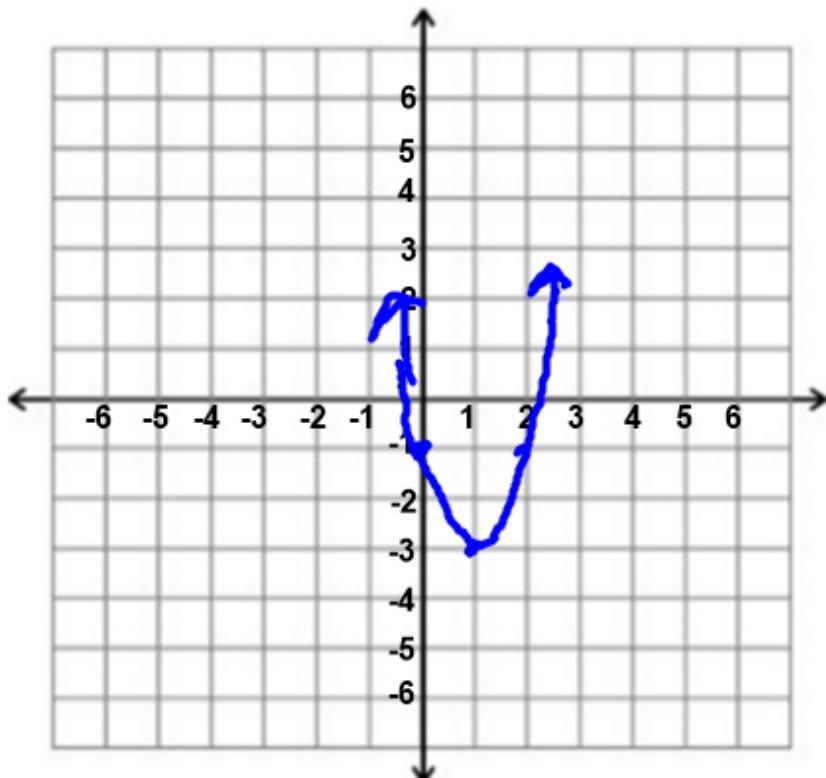
$$y = \frac{x + 5}{\sqrt{3 - x}}$$

$$3 - x > 0$$

$$\boxed{3 > x}$$

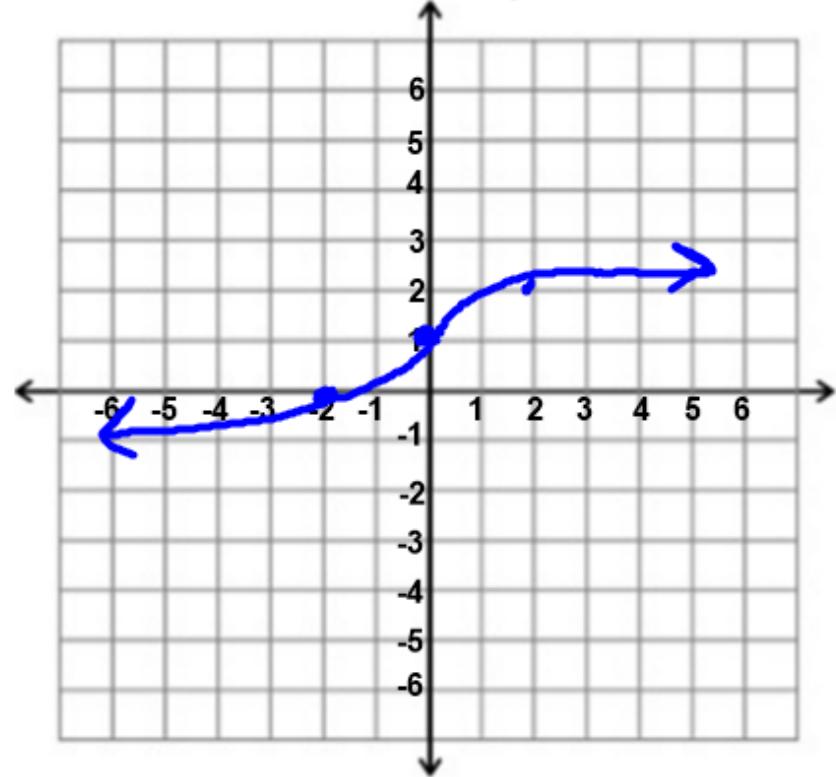
Graphing Parent Functions

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



$$\begin{aligned}(-1, 1) &\rightarrow (-1, 2) \\(0, 0) &\rightarrow (0, 0) \\(1, 1) &\rightarrow (1, 2)\end{aligned}$$

$$g(x) = \sqrt[3]{\frac{x}{2}} + 1$$

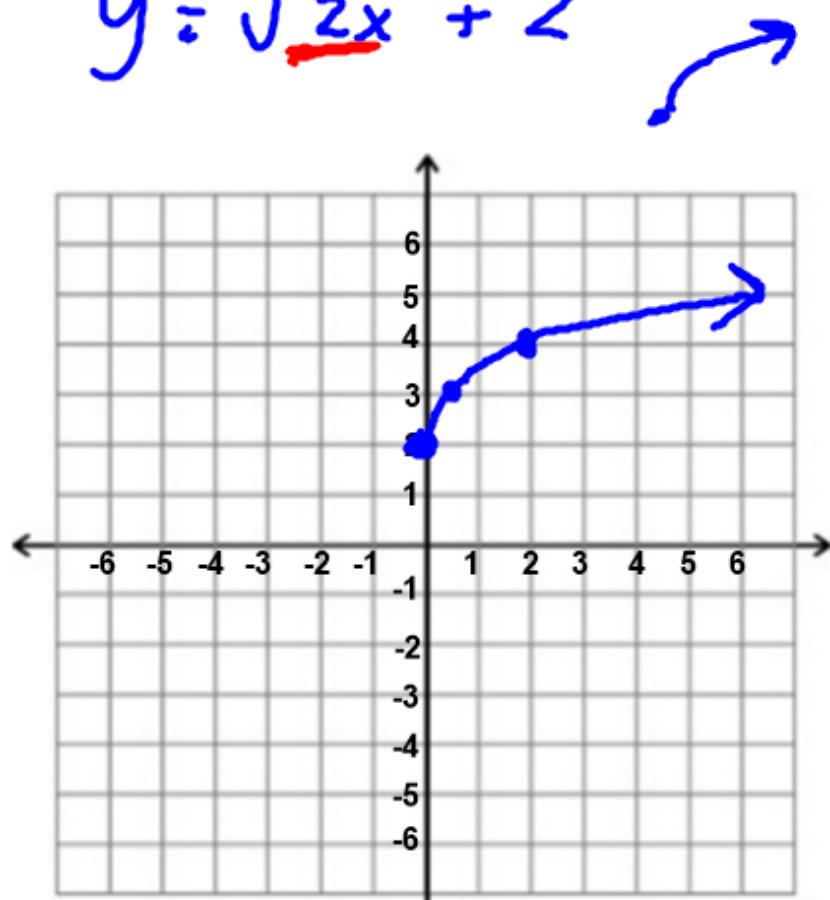


$$\begin{aligned}(-1, -1) &\rightarrow (-2, -1) \\(0, 0) &\rightarrow (0, 0) \\(1, 1) &\rightarrow (2, 1)\end{aligned}$$

Graphing Parent Functions



$$y = \sqrt{2x} + 2$$

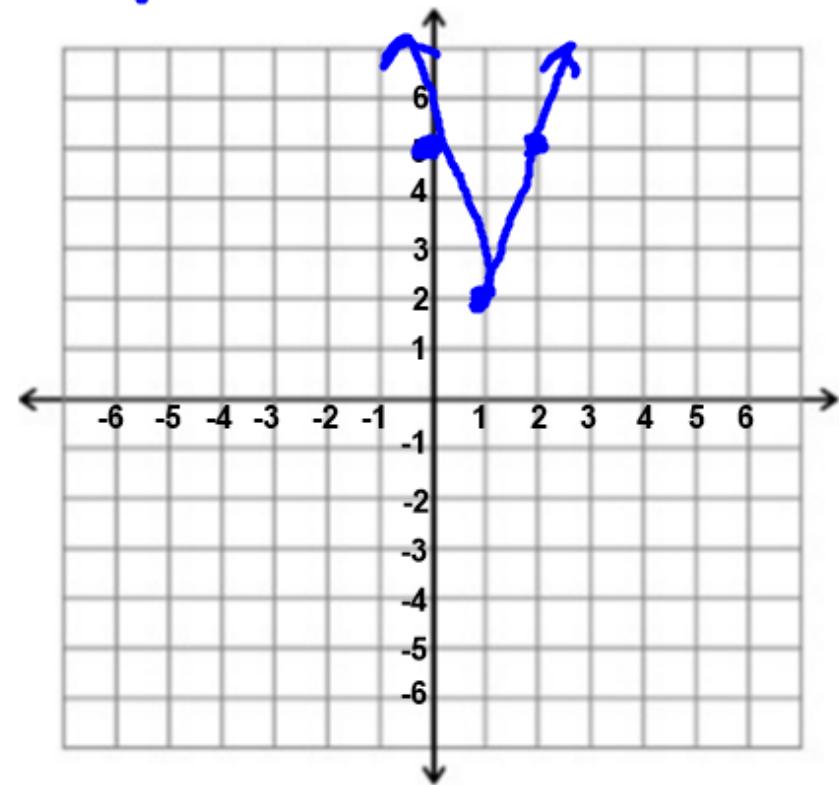


$$(4, 2) \rightarrow (2, 2)$$

$$(0, 0) \rightarrow (0, 0)$$

$$(1, 1) \rightarrow (2, 1)$$

$$y = 3|x-1| + 2$$



$$(1, 1) \rightarrow (1, 3)$$

$$(0, 0) \rightarrow (0, 0)$$

$$(-1, 1) \rightarrow (-1, 3)$$

Inverses

Find the inverse.

$$f(x) = x^2 - 1, \boxed{x \leq 0}$$

$$y = x^2 - 1$$

$$y + 1 = x^2$$

$$\boxed{-\sqrt{y+1} = x}$$

$$f^{-1}(y) = -\sqrt{y+1}$$

$$f(x) = \frac{2}{x+3}$$

$$(x+3)y = \frac{2}{x+3} \cdot (x+3)$$

$$\cancel{(x+3)}y = \frac{2}{\cancel{x+3}}$$

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

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

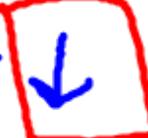
$$f^{-1}(y) = \frac{2}{y} - 3$$

Degree and End Behavior

Find the degree and end behavior.

$$y = 3x^2 - 8x^5 + 19$$

D: 5 (odd)

EB: ↑ 

$$y = 4x^7 + x^4 + 12x^{10}$$

D: 10

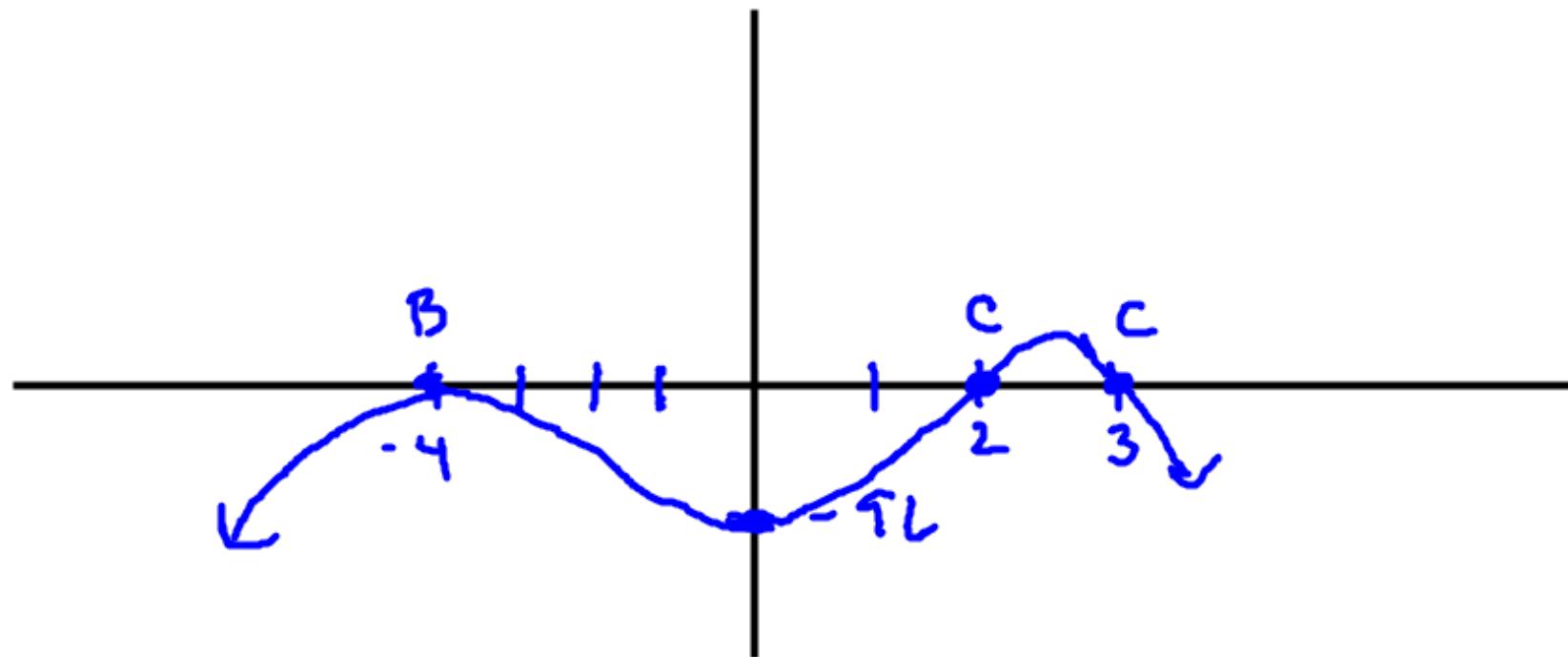
EB: ↑↑

Sketching Polynomials (1 of 2)

$$y = 1(2-x)(x+4)^2(x-3)$$

$x=2$ $x=-4$ $x=3$
C B C

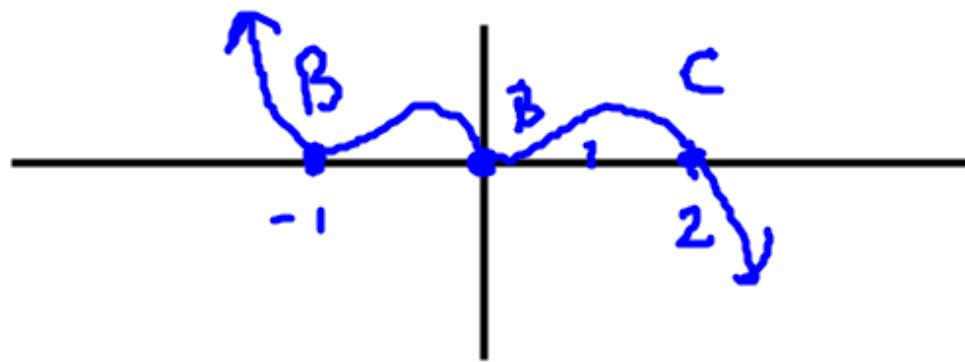
E.B. $\downarrow \downarrow$
Degree: 4 (even)
L.C.: $1(-1)(1)^2(1)$
 $= -1$



y-int: $y = (2-0)(0+4)^2(0-3)$
 $= \boxed{-96}$

Sketching Polynomials (2 of 2)

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



Polynomial Division (1 of 2)

$$(x^3 + 5x^2 - 3x - 1) \div (x^2 - 1)$$

$$\begin{array}{r} x^2 - 1 \quad | \quad x^3 + 5x^2 - 3x - 1 \\ \cancel{x^3} \quad \quad \quad - (x^3 \quad \quad \quad - x) \\ \hline 5x^2 - 2x - 1 \\ - (5x^2 \quad \quad \quad - 5) \\ \hline -2x + 4 \end{array}$$

The diagram shows the polynomial division process. The divisor $x^2 - 1$ is written vertically on the left. The dividend $x^3 + 5x^2 - 3x - 1$ is written under it. The first term of the quotient, x , is written above the dividend. The product of the divisor and the first term of the quotient, $x^3 - x$, is written below the dividend with a minus sign. The remainder of the dividend after subtracting this product is $5x^2 - 2x - 1$. This remainder is then divided by the divisor again. The second term of the quotient, 5 , is written above the remainder. The product of the divisor and the second term of the quotient, $5x^2 - 5$, is written below the remainder with a minus sign. The final remainder is $-2x + 4$. The entire quotient $x + 5$ and the remainder $\frac{-2x + 4}{x^2 - 1}$ are enclosed in a blue box.

Polynomial Division (2 of 2)

$$(6x^3 + 2x^2 - 11x + 12) \div (3x + 4)$$

Factoring (1 of 2)

$$\underline{3x^3 + 8x^2} \overline{- 12x - 32}$$

$$x^2(\underline{3x+8}) - 4(\underline{3x+8})$$

$$(\underline{x^2 - 4})(3x+8)$$

$$\boxed{(x+2)(x-2)(3x+8)}$$

$$\underline{4x^4 - 5x^2 - 9}$$

$$(4x^2 - 9)(x^2 + 1)$$

$$\boxed{(2x-3)(2x+3)(x^2+1)}$$

$$a^3 + b^3 \\ = (a+b)(a^2 - ab + b^2)$$

$$\underline{250x^3 + 128} \\ 2(125x^3 + 64) \\ a=5x \quad b=4$$

$$\boxed{2(5x+4)(25x^2 - 20x + 16)}$$

$$a^3 - b^3 \\ = (a-b)(a^2 + ab + b^2)$$

Factoring (2 of 2)

$$2x^3 + 9x^2 + 13x + 6$$

$$\begin{array}{r} -1 \\ \underline{\downarrow} \quad 2 \quad 9 \quad 13 \quad 6 \\ 1 \quad -2 \quad -7 \quad -6 \\ \hline 2 \quad 7 \quad 6 \quad 0 \end{array}$$

$$(x+1)(2x^2 + 7x + 6)$$

$$\boxed{(x+1)(2x+3)(x+2)}$$

Finding Zeros (1 of 2)

$$x^4 - 5x^2 = 14$$

$$x^{\textcircled{4}} - 5x^{\textcircled{2}} - 14 = 0$$

$$\underbrace{(x^2 - 7)}_{\downarrow} \quad \underbrace{(x^2 + 2)}_{\downarrow} = 0$$

$$x^2 - 7 = 0$$

$$x^2 = 7$$

$$x = \pm\sqrt{7}$$

$$x^2 + 2 = 0$$

$$x^2 = -2$$

$$x = \pm i\sqrt{2}$$

Finding Zeros (2 of 2)

$$x^6 + 8x^3 = 0$$

$$x^3(x^3 + 8) = 0$$

$$\begin{array}{cccc} x^3 & (x+2)(x^2 - 2x + 4) \\ \hline x=0 & x=-2 & x = \frac{2 \pm \sqrt{(-2)^2 - 4(4)}}{2(1)} \\ & & = \frac{2 \pm \sqrt{-12}}{2} = 1 \pm i\sqrt{3} \end{array}$$

$$x = 0, -2, 1 \pm i\sqrt{3}$$