Semester 1 Review

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Average Rate of Change

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Graphing Trig

Average Rate of Change (1 of 2)

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$f(x) = x^2 - 6x + 5$$

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

1. Find the average rate of change from 0 to x.

$x_1 \quad x_2$

$y_1 = (0)^2 - 6(0) + 5 = 5$

$y_2 = x^2 - 6x + 5$

$$\frac{(x^2 - 6x + 5) - (5)}{(x) - (0)} = \frac{x^2 - 6x}{x} = \frac{x(x-6)}{x}$$

$$= \boxed{x - 6}$$

2. Find the average rate of change from 0 to 4.

$4 - 6 = \boxed{-2}$

Average Rate of Change (2 of 2)

$$f(x) = x^2 - 6x + 5$$

3. Find the average rate of change from -1 to 2.

Inverses

Find the inverse.

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

$y = x^2 - 1$

$+1 \qquad +1$

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

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

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

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

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

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

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

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

$f^{-1}(x) = \dfrac{2}{x} - 3$

Sketching Polynomials (1 of 2)

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

$x \cdot x^2 \cdot x = x^4$

End Behavior: LC: -1

D: 4 (even)

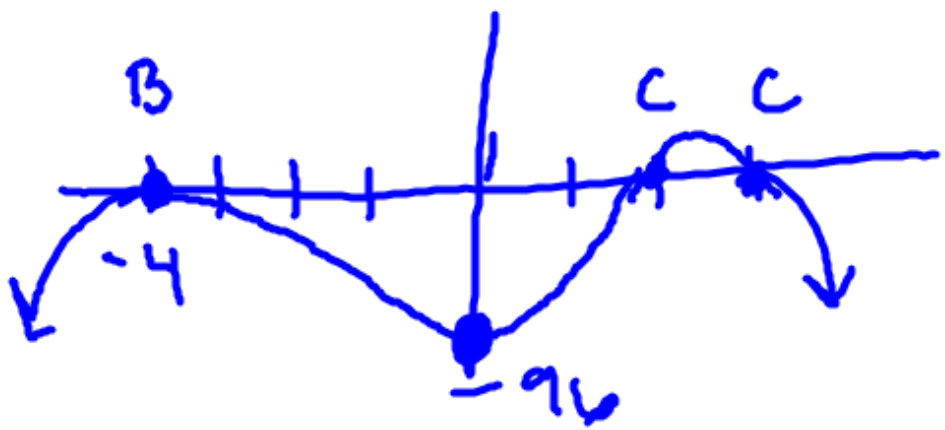
$\boxed{\downarrow\downarrow}$

y-int:

$(2-0)(0+4)^2(0-3) = -96$

x-int: $x = 2, -4, 3$

C B C



	even d	odd d
+ LC	↑↑	↓↑
− LC	↓↓	↑↓

Sketching Polynomials (2 of 2)

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

EB: D: 5

LC: −1

$\boxed{\uparrow\downarrow}$

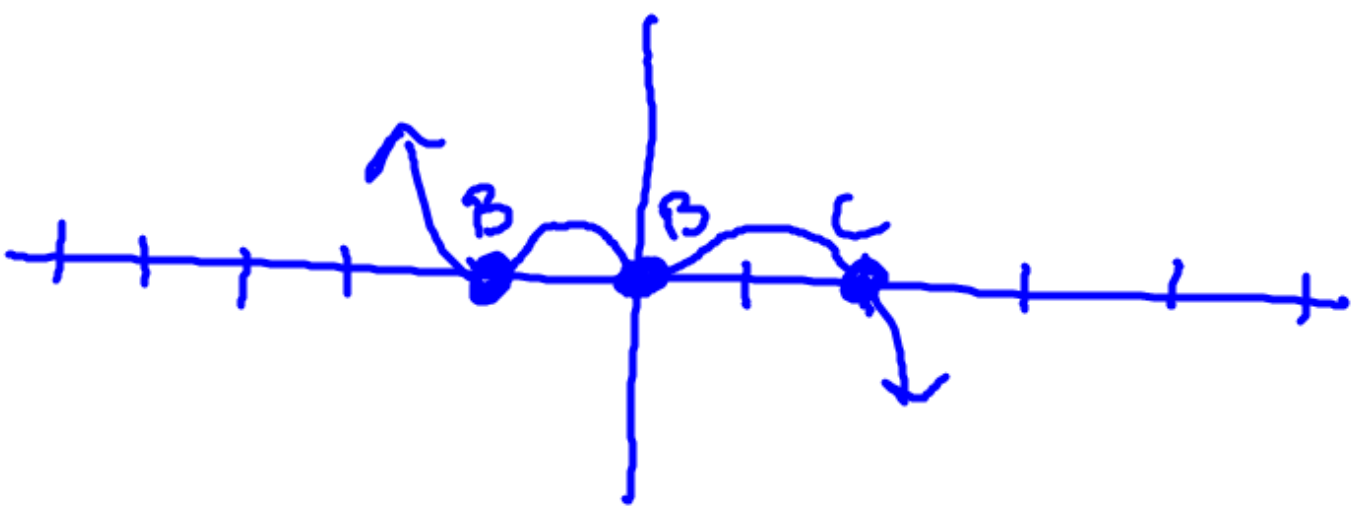
x-int:

$x = 0, -1, 2$

B B C

y-int: $-0^2(0+1)^2(0-2)$

$= \boxed{0}$



Factoring (1 of 2)

$$3x^3 + 8x^2 - 12x - 32$$

$$x^2(3x+8) - 4(3x+8)$$

$$(x^2-4)(3x+8)$$

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

$$4x^4 - 5x^2 - 9$$

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

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

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

Factoring (2 of 2)

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

$$250x^3 + 128$$

$\frac{250}{2}$ $\frac{128}{2}$

$2(125x^3 + 64)$

$a = 5x$ $b = 4$

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

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

$\pm \frac{1, 2, 3, 6}{1, 2}$

-1	2	9	13	6
	↓	-2	-7	-6
	2	7	6	0

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

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

Asymptotes/Holes (1 of 2)

Find the vertical asymptote(s) and any holes.

$$f(x) = \frac{x^2 - 5x + 6}{2x^2 - 8} \rightarrow 2(x^2 - 4)$$

$$g(x) = \frac{2x + 1}{x^3 - 9x}$$

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

$\boxed{\text{Hole: } (2, -1/8)}$

$$\frac{2-3}{2(2+2)} = \frac{-1}{8}$$

VA: $x = -2$

Asymptotes/Holes (2 of 2)

Find the horizontal/oblique asymptote.

Degrees	
$n < d$	$y = 0$
$n = d$	$y = \frac{a}{b}$
$n > d$	OA: Division

$$g(x) = \frac{2x^2 + 1}{1x^2 - 3x + 2}$$

$$\boxed{y = 2}$$

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

$$\begin{array}{r} 2x \\ x^2 + 3 \overline{\big) 2x^3 + 0x^2 - x + 1} \\ -(2x^3 \qquad + 6x) \\ \hline -7x + 1 \end{array}$$

$$\frac{2x^3}{x^2} = 2x$$

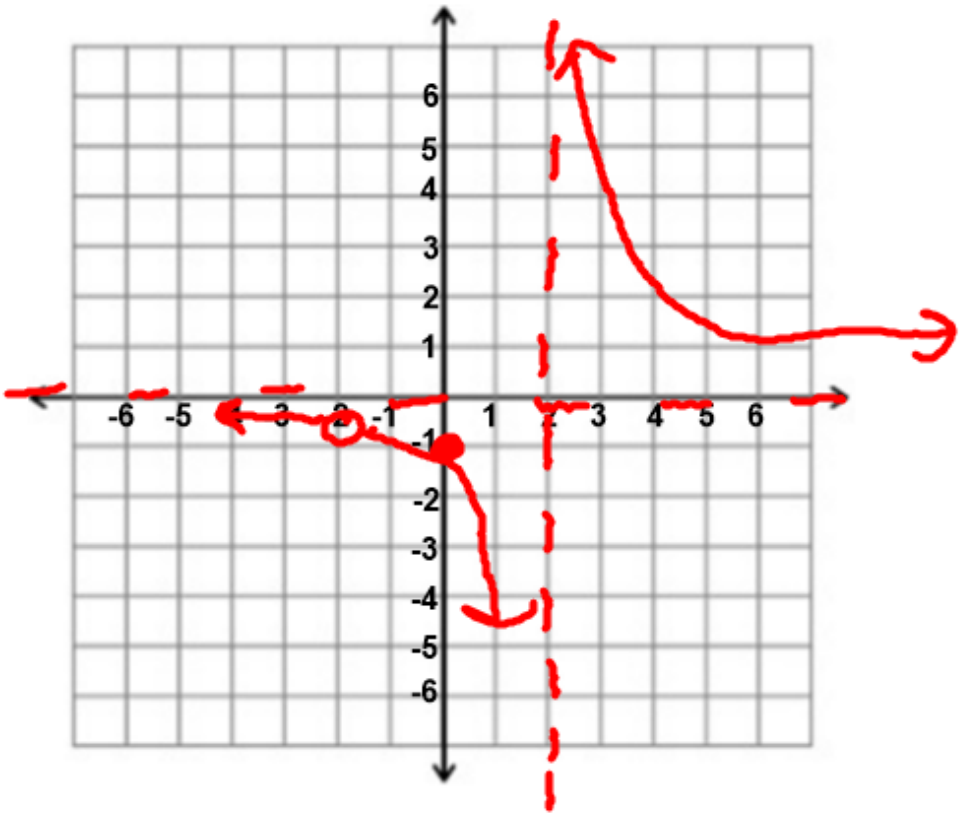
$$\cancel{-\frac{7x}{x^2} - \frac{7}{x}}$$

$$\cancel{+\frac{-7x+1}{x^2+3}}$$

$$\boxed{y = 2x}$$

Graphing Rational Functions (1 of 2)

$$f(x) = \frac{2x+4}{x^2-4} = \frac{2\cancel{(x+2)}}{\cancel{(x+2)}(x-2)} = \frac{2}{x-2}$$



Hole: $(-2, -\frac{1}{2})$

VA: $x = 2$

HA/OA: $y = 0$

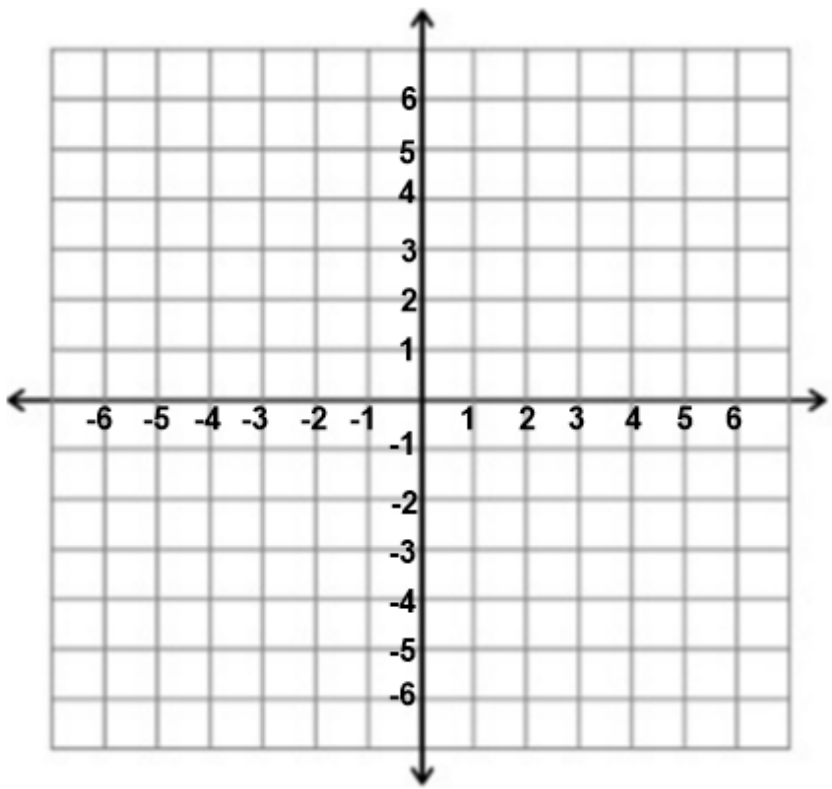
x-int: None

y-int:

$$\frac{2}{0-2} = -1$$

Graphing Rational Functions (2 of 2)

$$f(x) = \frac{x^2 - 5x + 6}{x - 1}$$

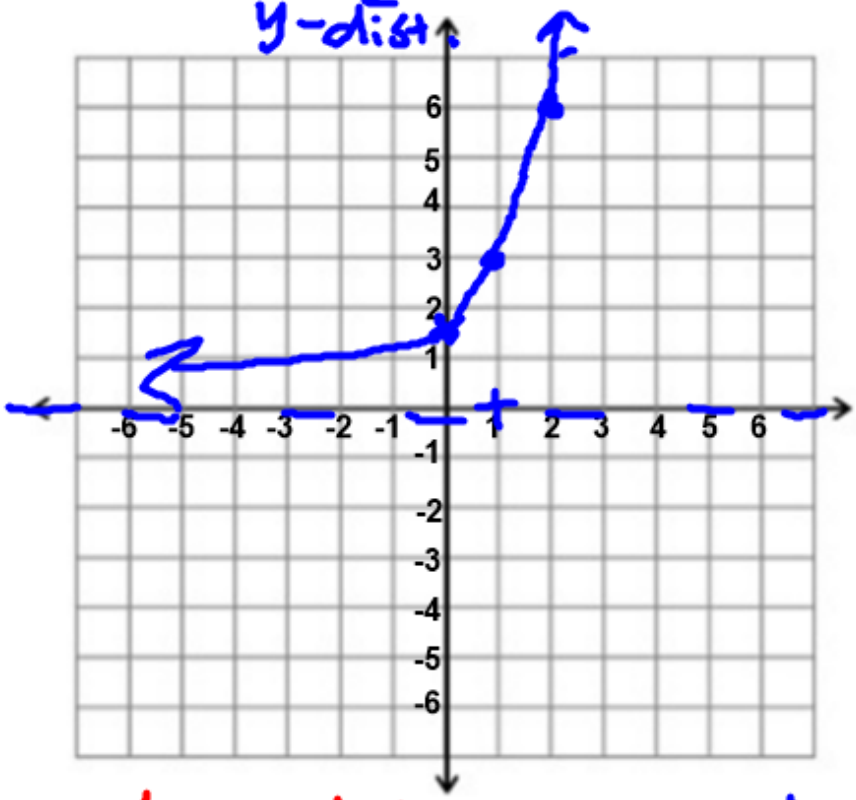


$\boxed{y = b^x}$

Graphing Log/Exponents (1 of 2)

$y = 3(2)^{x-1}$

y-dist.

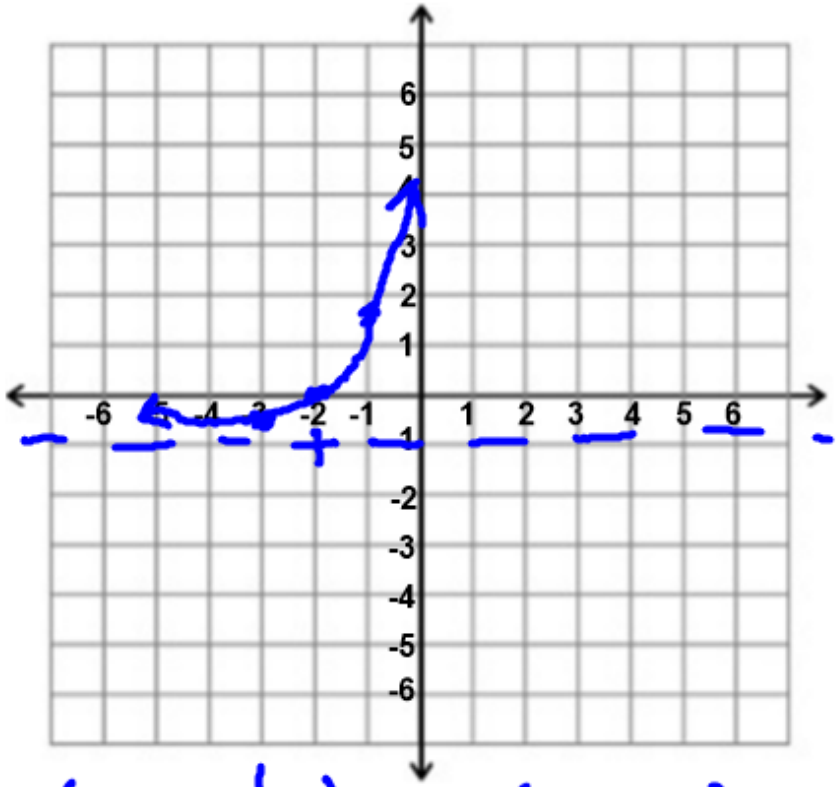


$(-1, \frac{1}{2}) \rightarrow (-1, 3/2)$

$(0, 1) \rightarrow (0, 3)$

$(1, 2) \rightarrow (1, 6)$

$y = e^{x+2} - 1$



$(-1, \frac{1}{e}) \approx (-1, .4)$

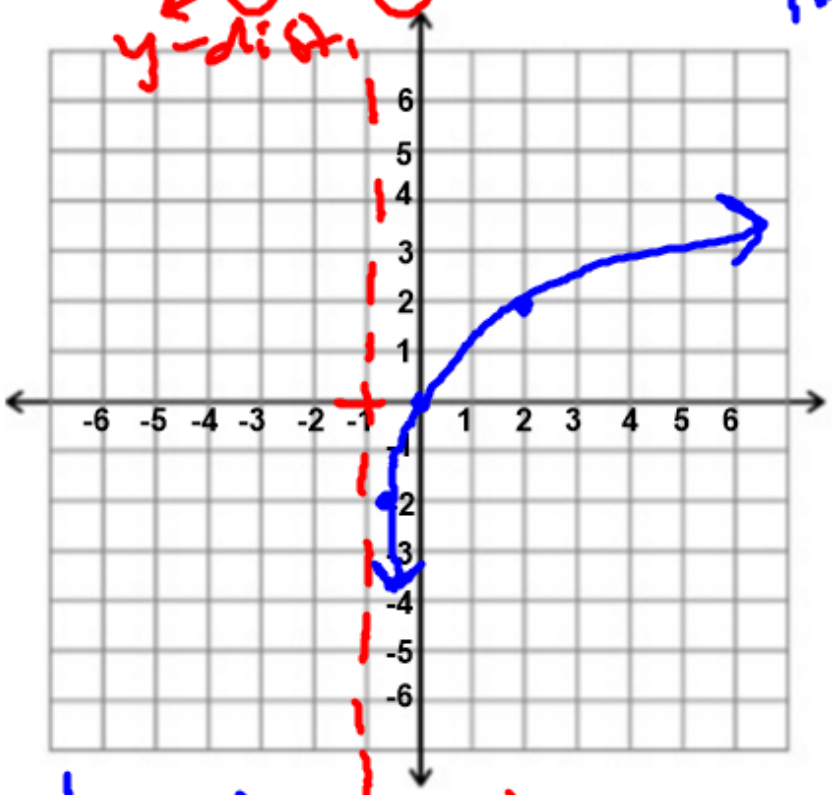
$(0, 1) \approx (0, 1)$

$(1, e) \approx (1, 2.7)$

Graphing Log/Exponents (2 of 2)

$y = 2\log_3(x+1)$

y-dil.

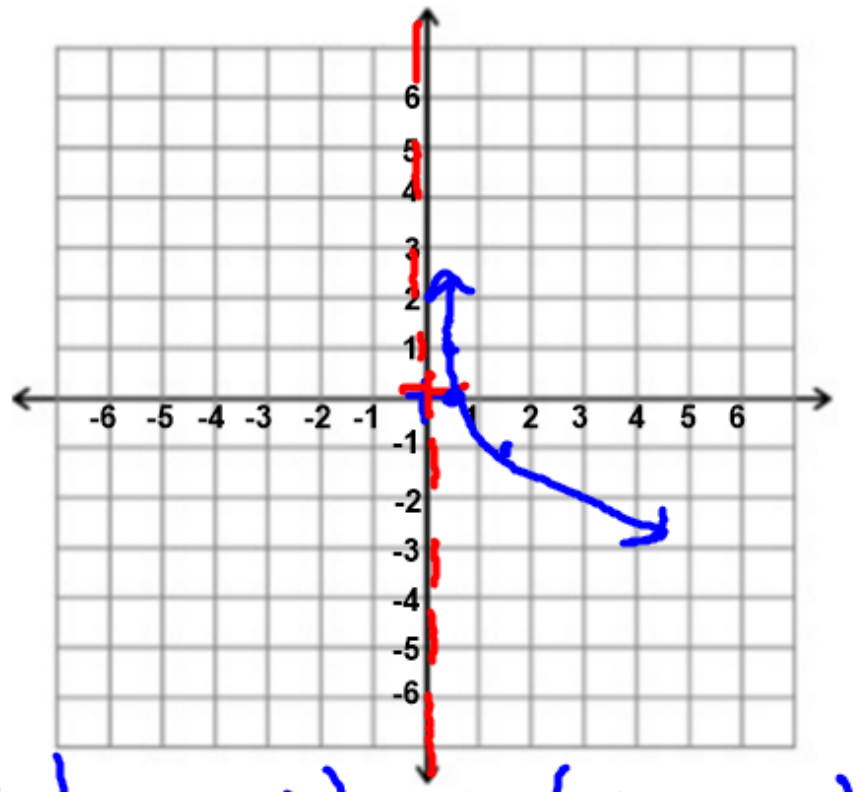


$(\frac{1}{3}, -1) \rightarrow (\frac{1}{3}, -2)$

$(1, 0) \rightarrow (1, 0)$

$(3, 1) \rightarrow (3, 2)$

$y = -\ln(2x)$



$(\frac{1}{e}, -1) \rightarrow (.2, 1)$

$(1, 0) \rightarrow (\frac{1}{2}, 0)$

$(e, 1) \rightarrow (1.35, -1)$

Solving with Logs (1 of 2)

$2\log x = \log 2 + \log(3x - 4)$

$5x + 12 = \log_7 49$

Solving with Logs (2 of 2)

$\log_5 125 + 2\log_5(x+2) = 7$

$1 + e^{4x+1} = 20$

Evaluating Trig (1 of 2)

$$\sin\left(-\frac{9\pi}{4}\right)$$

*

$$\cos\left(\frac{17\pi}{6}\right)$$

$$\tan\left(\frac{7\pi}{2}\right)$$

Evaluating Trig (2 of 2)

$\sec 5\pi$

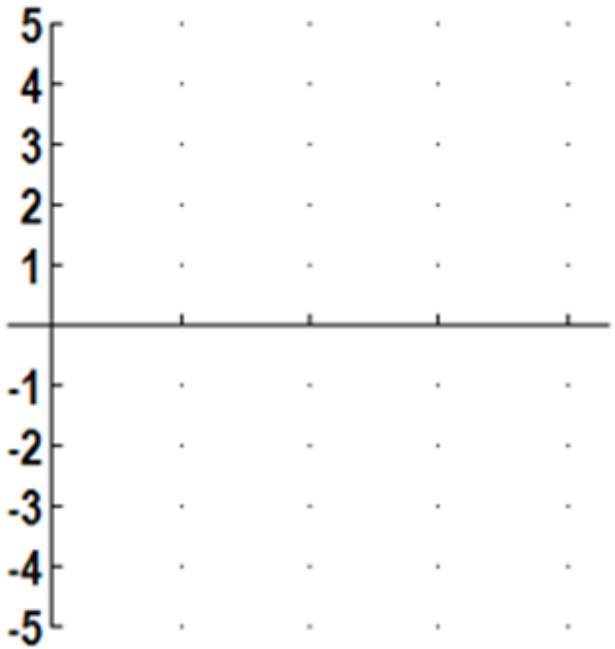
*

$\csc\left(-\frac{13\pi}{3}\right)$

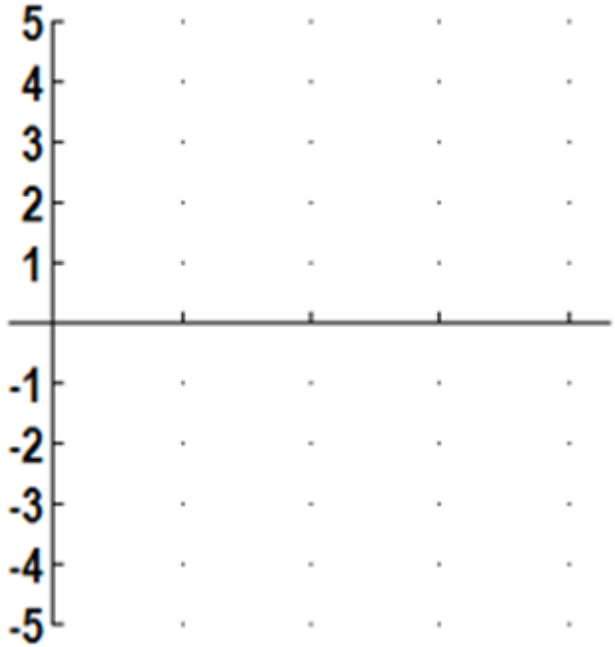
$\cot\left(-\frac{5\pi}{6}\right)$

Graphing Trig (1 of 2)

$$y = 2\sin\left(x + \frac{\pi}{4}\right)$$

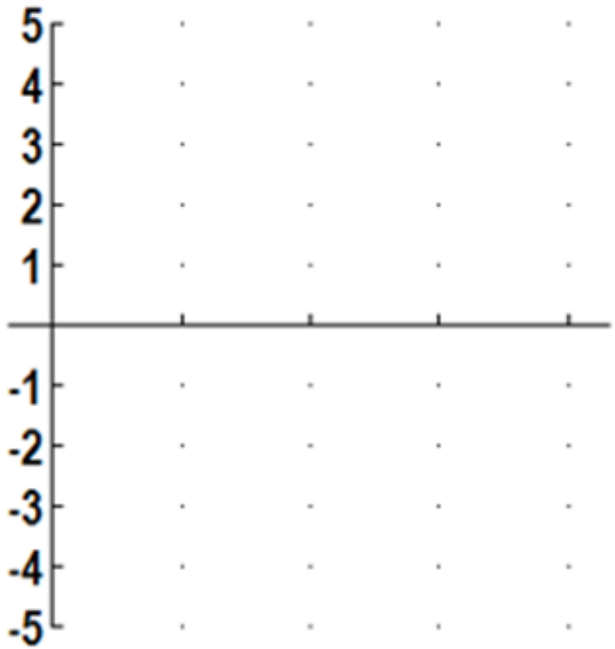


$$y = -3\cos\left(\frac{x}{2}\right) - 1$$



Graphing Trig (2 of 2)

$y = 2\tan(3x) + 1$



$y = 4\sec\left(\frac{\pi}{2}x\right)$