

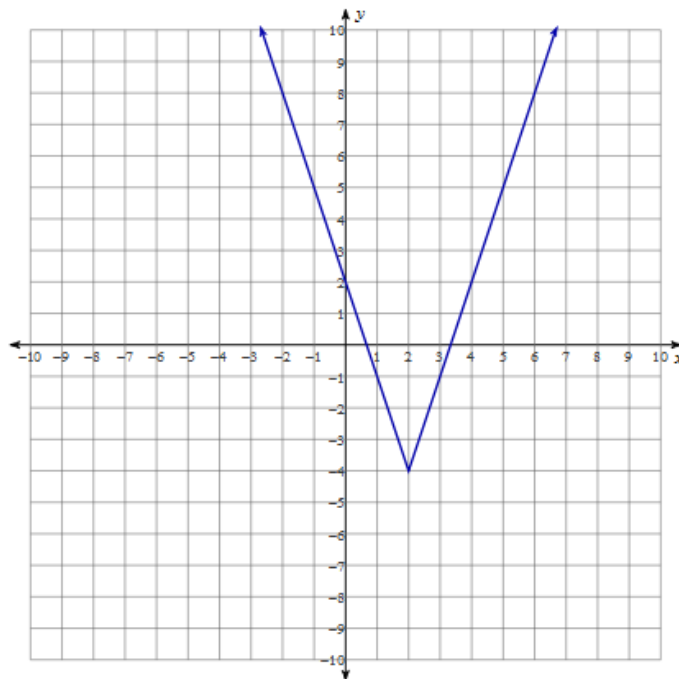
# Function Toolkit #1

Use the Function Toolkit to sketch a graph of each of the following functions on the coordinate axes provided. Show all work, calculations, and tables where appropriate. State the domain, range, vertex, x- and y-intercepts when requested.

1.  $y = 3|x - 2| - 4$

Mapping Rule: $(x, y) \rightarrow (x+2, 3y-4)$			
Base Function $y =  x $		New Function	
-3	3	-1	5
-2	2	0	2
-1	1	1	-1
0	0	2	-4
1	1	3	-1
2	2	4	2
3	3	5	5

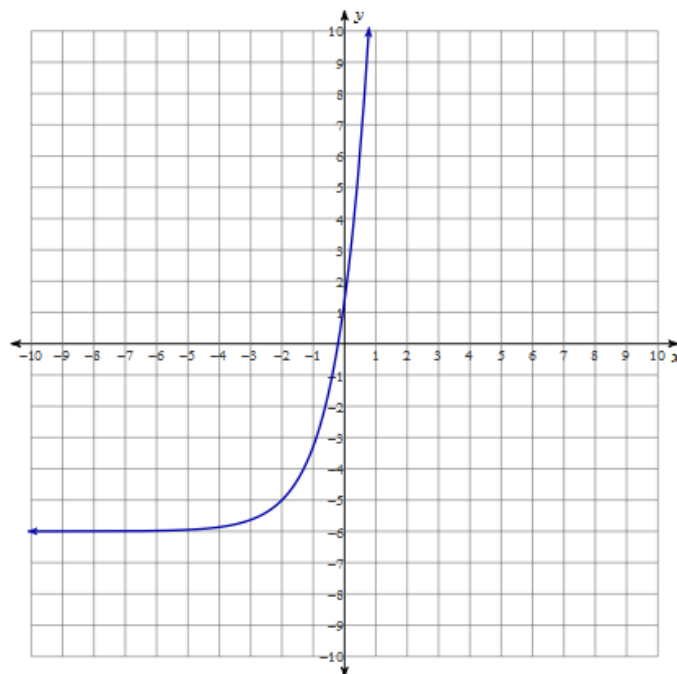
x-int	y-int	Domain	Range
$(2/3, 0)$ $(10/3, 0)$	$(0, 2)$	$\{x \in \mathbb{R}\}$	$y \geq -4$



2.  $y = e^{x+2} - 6$

Mapping Rule: $(x, y) \rightarrow (x-2, y-6)$			
Base Function $y = e^x$		New Function	
-2	0.14	-4	-5.86
-1	0.37	-3	-5.63
0	1	-2	-5
1	2.72	-1	-3.28
2	7.39	0	1.39

x-int	y-int	Domain	Range
$(-0.2, 0)$	$(0, 1.39)$	$\{x \in \mathbb{R}\}$	$y > -6$

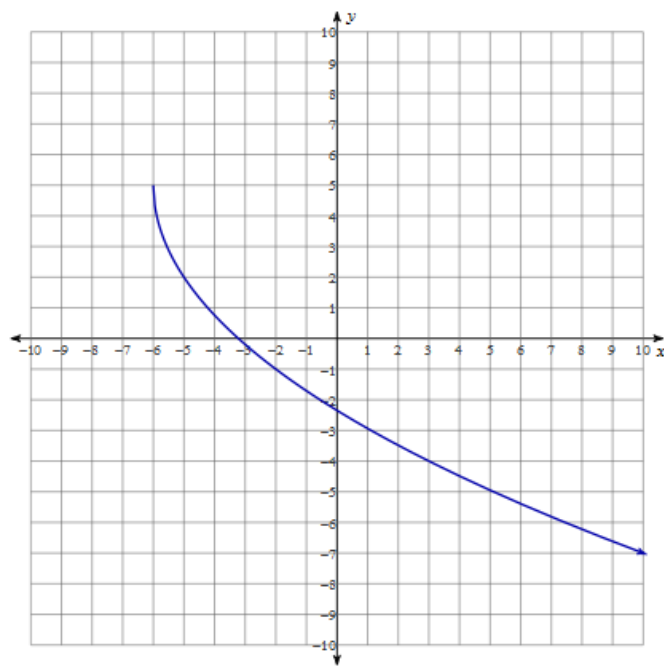


Pre-Calculus 120B

3.  $y = -3\sqrt{x+6} + 5$

Mapping Rule: $(x, y) \rightarrow (x-6, -3y+5)$			
Base Function $y = \sqrt{x}$		New Function	
0	0	-6	5
1	1	-5	2
4	2	-2	-1
9	3	3	-4
16	4	10	-7

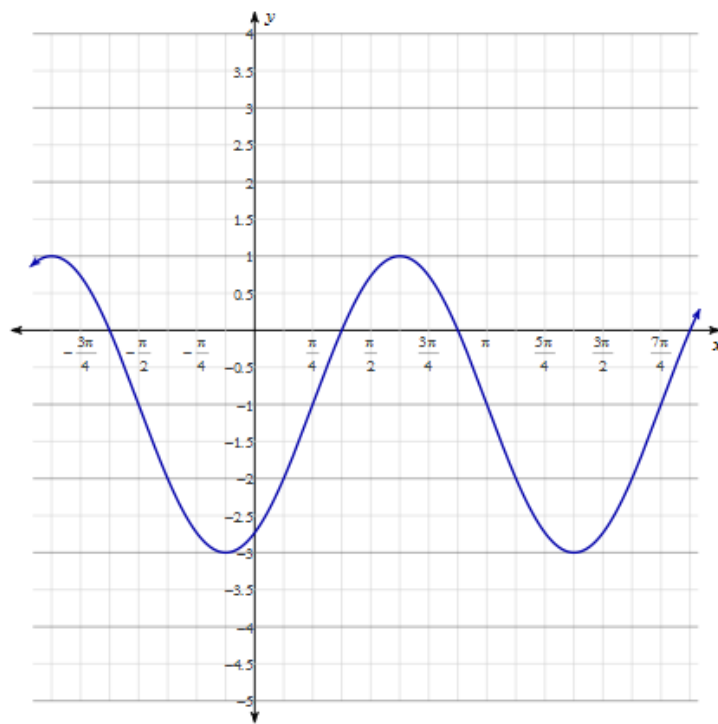
x-int	y-int	Domain	Range
$(-3.2, 0)$	$(0, -2.3)$	$\{x \geq -6\}$	$y \leq 5$



4.  $y = 2\sin\left(\frac{4}{3}\left(x - \frac{\pi}{4}\right)\right) - 1$

Mapping Rule: $(x, y) \rightarrow (3/4x + \frac{\pi}{4}, 2y-1)$			
Base Function $y = \sin x$		New Function	
0	0	$\frac{\pi}{4} = \frac{2\pi}{8}$	-1
$\frac{\pi}{2}$	1	$\frac{5\pi}{8}$	1
$\pi$	0	$\pi$	-1
$\frac{3\pi}{2}$	-1	$\frac{11\pi}{8}$	-3
$2\pi$	0	$\frac{14\pi}{8} = \frac{7\pi}{4}$	-1

x-int	y-int	Domain	Range
$x = \frac{3\pi}{8} + \frac{3\pi n}{2}, n \in I$ $x = \frac{7\pi}{8} + \frac{3\pi n}{2}, n \in I$	$(0, -2.73)$	$\{x \in R\}$	$-3 \leq y \leq 1$



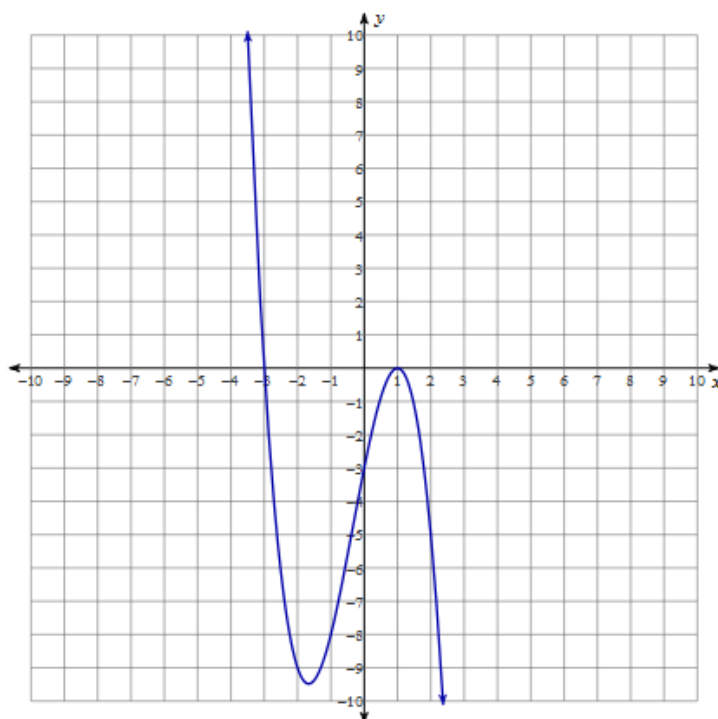
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5.  $y = -x^3 - x^2 + 5x - 3$

Factor to find all the x-intercepts.

$$y = -(x+3)(x-1)(x-1)$$

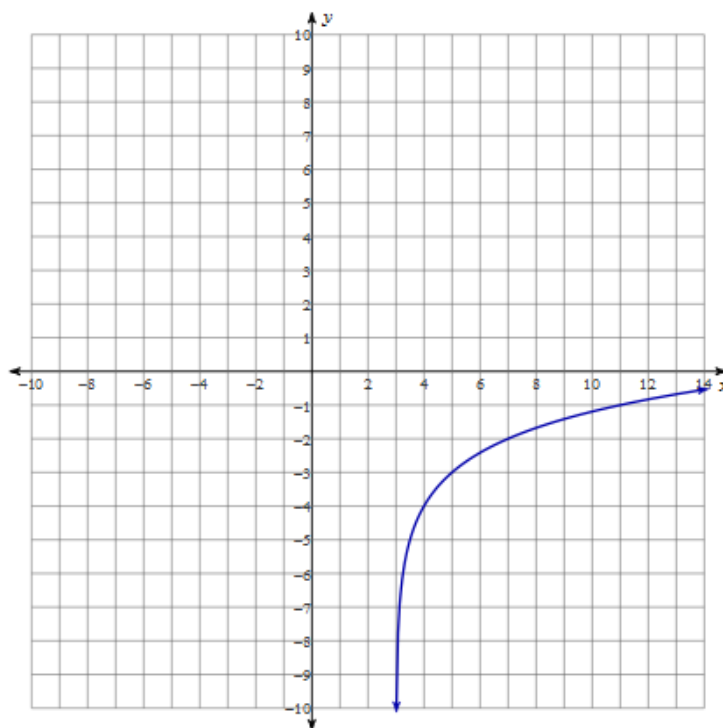
x-int	y-int	Domain	Range
(-3,0) (1,0)	(0,-3)	$\{x \in \mathbb{R}\}$	$y \in \mathbb{R}$
Other points: (-2,-9), (-1,-8), (2,-5)			



6.  $y = \log_2(x-3) - 4$

Mapping Rule: $(x, y) \rightarrow (x+3, y-4)$			
Base Function $y = \log_2 x$ $2^y = x$		New Function	
0.25	-2	3.25	-6
0.5	-1	3.5	-5
1	0	4	-4
2	1	5	-3
4	2	7	-2
8	3	11	-1

x-int	y-int	Domain	Range
(19,0)	no y-int	$\{x > 3\}$	$y \in \mathbb{R}$

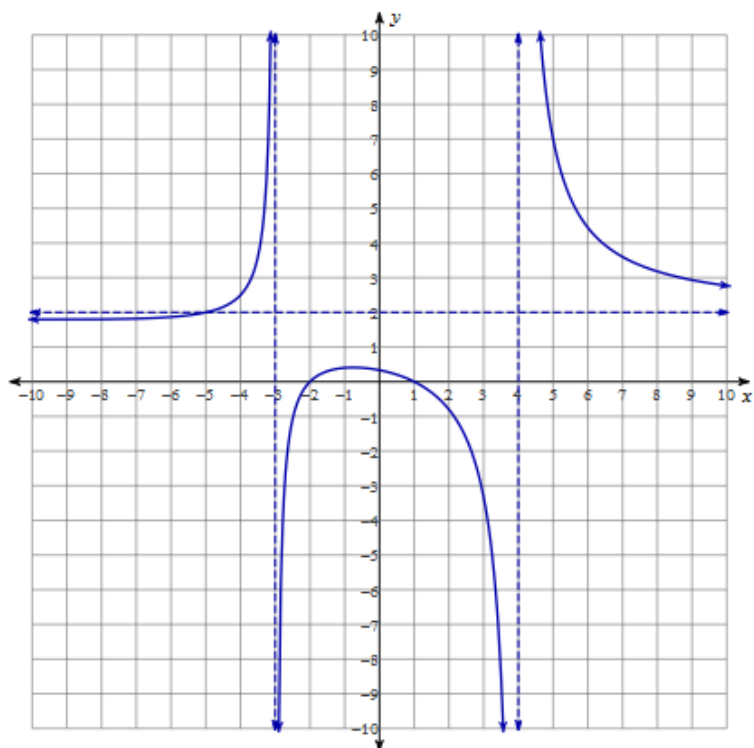


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7.  $y = \frac{2x^2 + 2x - 4}{x^2 - x - 12}$

Factored form:  $\frac{2(x+2)(x-1)}{(x-4)(x+3)}$

x-int	y-int	Domain	Range
(-2,0) (1,0)	(0,1/3)	$\{x \neq -3, 4\}$	-----
Other points: (-5, 2), (-4, 2.5), (-1, 0.4), (2, -0.8), (3, -3.3), (5, 7)			



8.  $y = \frac{1}{(x+3)^2} - 2$

Mapping Rule: $(x, y) \rightarrow (x-3, y-2)$			
Base Function $y = \frac{1}{x^2}$		New Function	
-2	1/4	-5	-1.75
-1	1	-4	-1
0	-----	-3	-----
1	1	-2	-1
2	1/4	-1	-1.75

x-int	y-int	Domain	Range
(-2.3, 0) (-3.7, 0)	(0,-1.9)	$\{x \neq -3\}$	$y > -2$

