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<u>Practice Worksheet:</u> Increasing/Decreasing/Constant, Continuity, and End Behavior

Determine if the function is continuous or discontinuous, describe the end behavior, and then determine the intervals over which each function is increasing, decreasing, and constant. Write "none" if there is no interval.

[1] $f(x) = x^3 - 2x^2 + 2$	Continuous/Discontinuous	[2]	Continuous/Discontinuous
$f(x) = x^{4} - 3x^{4} + 2$	End Behavior:	$f(x) = \frac{1}{2}( x-2  -  x+2 )$	End Behavior:
<sup>3</sup> (0, 2) 2	$x \rightarrow \infty, y \rightarrow \underline{\qquad}$	(-2, 2) 3	$x \rightarrow \infty, y = \underline{\qquad}$ $x \rightarrow \infty, y = \underline{\qquad}$
-3 -2 -1 2 3 4 5	Increasing:		Increasing:
	Decreasing:		Decreasing:
-4 -5	Constant:	_3 (2, -2)	Constant:
[3]	Continuous/Discontinuous	[4] $x^2 + x + 1$	Continuous/Discontinuous
f(x) =  x + 1 +  x - 1	End Behavior:	$f(x) = \frac{x + x + 1}{x + 1}$	End Behavior:
4	$x \rightarrow \infty, y \rightarrow \underline{\qquad}$		$x \rightarrow \infty, y \rightarrow \underline{\qquad}$
$(-1, 2) \xrightarrow{2}_{1} (1, 2)$	Increasing:		Increasing:
-4 -3 -2 - <u>1</u> 1 2 3	Decreasing:	-4 -3 -2 -1 0 1 2 -4 -3 -2 -1 / 0 1 2	Decreasing:
-2	Constant:	(-2, -3)   -4   -5	Constant:
[5]	Continuous/Discontinuous	[6]	Continuous/Discontinuous
$f(x) = - x^2 - 4  - 3$	End Behavior: $x \rightarrow \infty$ $x \rightarrow$	$f(x) = \begin{cases} x+3, & x \le 0\\ 3, & 0 < x \le 2 \end{cases}$	End Behavior:
(-2, 3) 4 (2, 3)	$\begin{array}{c} x \rightarrow \infty, y \rightarrow \underline{\qquad} \\ x \rightarrow \infty, y \rightarrow \underline{\qquad} \end{array}$	(2x + 1, x > 2)	$x \rightarrow \infty, y \rightarrow \underline{\qquad}$
	Increasing:	(0, 3) <sup>4</sup>	Increasing:
	Decreasing:	(2, 3)	Decreasing:
	Constant:	-4-3 -2 - <u>1</u> 0 1 2 3 4 5	Constant:
[7]	Continuous/Discontinuous	[8]	Continuous/Discontinuous
$f(x) = -2\sqrt{x} + 7 + 3$	End Behavior:	$f(x) = \begin{cases} -\frac{1}{2}(x+9)^2 + 7: -9 < x \le -5\\ 2x+4: -4 < x \le 0 \end{cases}$	End Behavior:
(-7, 3) <sup>5</sup>	$\begin{array}{c} x \not \neg \_, y \not \neg \_\\ x \not \rightarrow \infty, y \not \rightarrow \_\_\_ \end{array}$	4: <i>x</i> > 0	$\begin{array}{c} x \not \neg & \\ x \not \rightarrow & \infty, y = \underline{\qquad} \end{array}$
	Increasing:	(-9, 7) (-9, 7) (0, 4)	Increasing:
-8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4	Decreasing:		Decreasing:
-3	Constant:	$\begin{array}{c} -9 & -8 & -7 & -6 & 5 & -4 & -3 & -2 & -1 \\ (-5, -1) & & & & & & \\ (-5, -1) & & & & & & \\ 0(-4, -4) & -4 & & & \\ \end{array}$	Constant:



Use your knowledge of parent graphs and transformations to sketch each function WITHOUT a graphing calculator. Determine if it is continuous or discontinuous, describe the end behavior, and determine the intervals over which each graph is increasing, decreasing, and constant. Write "none" if there is no interval.



Use a graphing calculator to make an accurate sketch of the graph. Determine if it is continuous or discontinuous, describe the end behavior, and determine the intervals over which each graph is increasing, decreasing, and constant. Write "none" if there is no interval.



## **BONUS QUESTION:**

Use a graphing calculator to determine the intervals over which the function is increasing, decreasing, and constant. Neatly sketch the graph and label the coordinates of all extrema. Round to 3 decimal places where needed

 $f(x) = 2|\sqrt{16 - x^2} - x| - 4$  Increasing:

Decreasing:

Constant:

