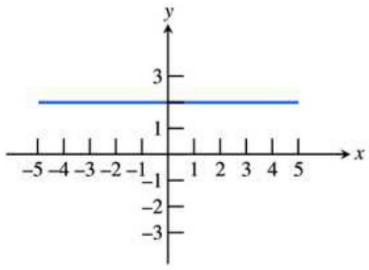
Constant, Increasing and Decreasing Functions

LO: The function $q(x)$ is a constant function because as the input x increases from $-\infty$ to ∞ there is no change in the function's corresponding output value , y is the same, does not change, or is constant all the time.

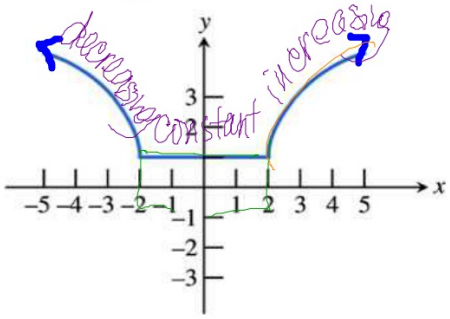


Constant

$q(x)$
$h(x)$
$f(x)$
$g(x)$

Constant, Increasing and Decreasing Functions

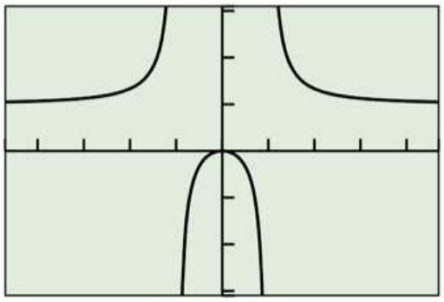
LQ: The function is decreasing from $-\infty$ to -2 because as the input x increases on this interval the y value goes down; The function is constant from -2 to 2 because as the input x increases on this interval the y value stays the same; The function is increasing from 2 to ∞ because as the input x increases on this interval the y value goes up.



Decreasing on $(-\infty, -2]$
Constant on $[-2, 2]$
Increasing on $[2, \infty)$

Example Analyzing a Function for Increasing-Decreasing Behavior

Given $g(x) = \dfrac{x^2}{x^2 - 1}$. Tell the intervals on which $g(x)$ is increasing and the intervals on which it is decreasing.



[–4.7, 4.7] by [–3.1, 3.1]

From the graph, we see that $g(x)$ is increasing on $(-\infty, -1)$, increasing on $(-1, 0]$, decreasing on $[0,1)$, and decreasing on $(1,\infty)$.

AM: Find intervals of increase & decrease

Identify the open intervals on which the function is increasing or decreasing:

1. $f(x) = 2x^3 - 12x^2 + 1$

[A] increasing on $(-\infty, 0)$ and $(4, \infty)$; decreasing on $(0, 4)$

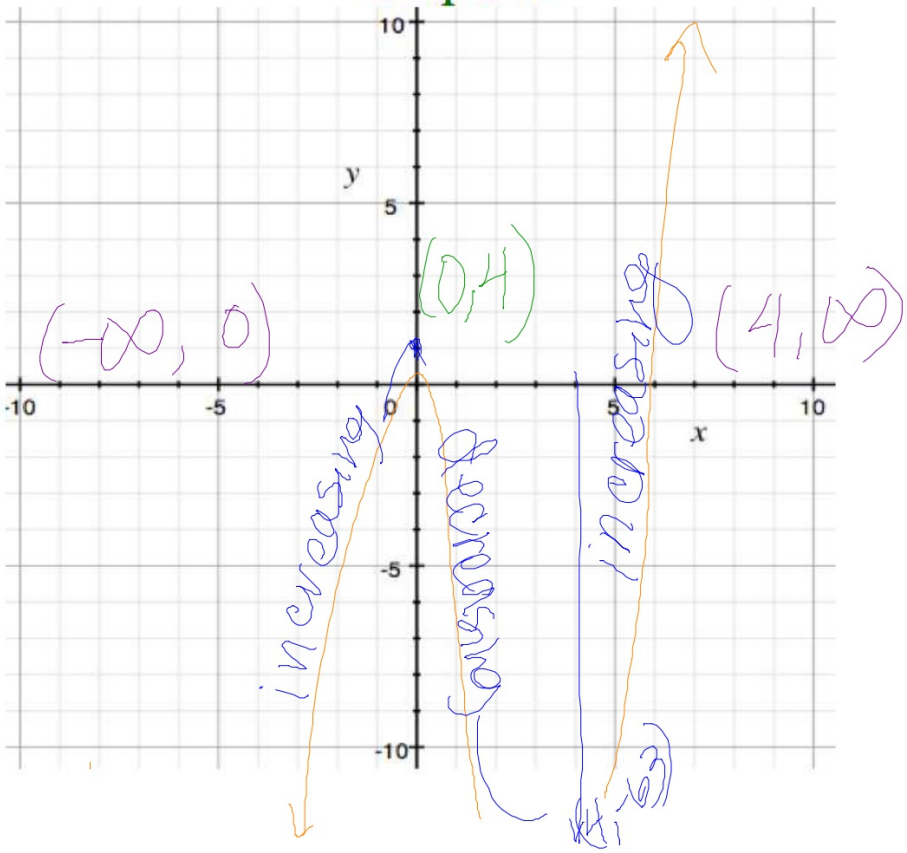
[B] increasing on $(2, \infty)$; decreasing on $(-\infty, 2)$

[C] increasing on $(0, 4)$; decreasing on $(-\infty, 0)$ and $(4, \infty)$

[D] increasing on $(-\infty, 2)$; decreasing on $(2, \infty)$

LO: The function is _____ from ____ to ____ because as the input x increases on this interval the y value _____; The function is _____ from ____ to ____ because as the input x increases on this interval the y value _____; The function is _____ from ____ to ____ because as the input x increases on this interval the y value _____.

Graph it!



AM: Find intervals of increase & decrease

2. $f(x) = \dfrac{1}{x^2 + 4x}$

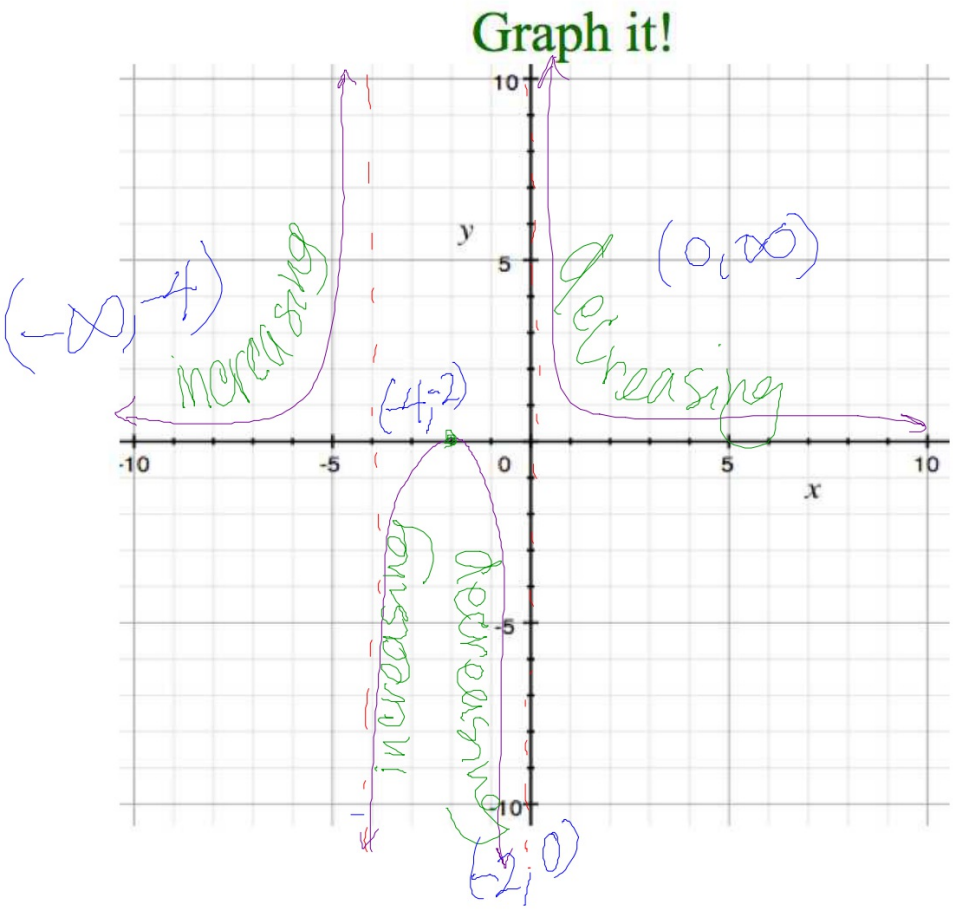
[A] increasing on $(-\infty, -2)$; decreasing on $(-2, \infty)$

[B] increasing on $(-2, 0)$ and $(0, \infty)$; decreasing on $(-\infty, -4)$ and $(-4, -2)$

[C] increasing on $(-\infty, -4)$ and $(-4, -2)$; decreasing on $(-2, 0)$ and $(0, \infty)$

[D] increasing on $(-2, \infty)$; decreasing on $(-\infty, -2)$

LO: The function is _____ from ____ to ____ because as the input x increases on this interval the y value _____; The function is _____ from ____ to ____ because as the input x increases on this interval the y value _____; The function is _____ from ____ to ____ because as the input x increases on this interval the y value _____.

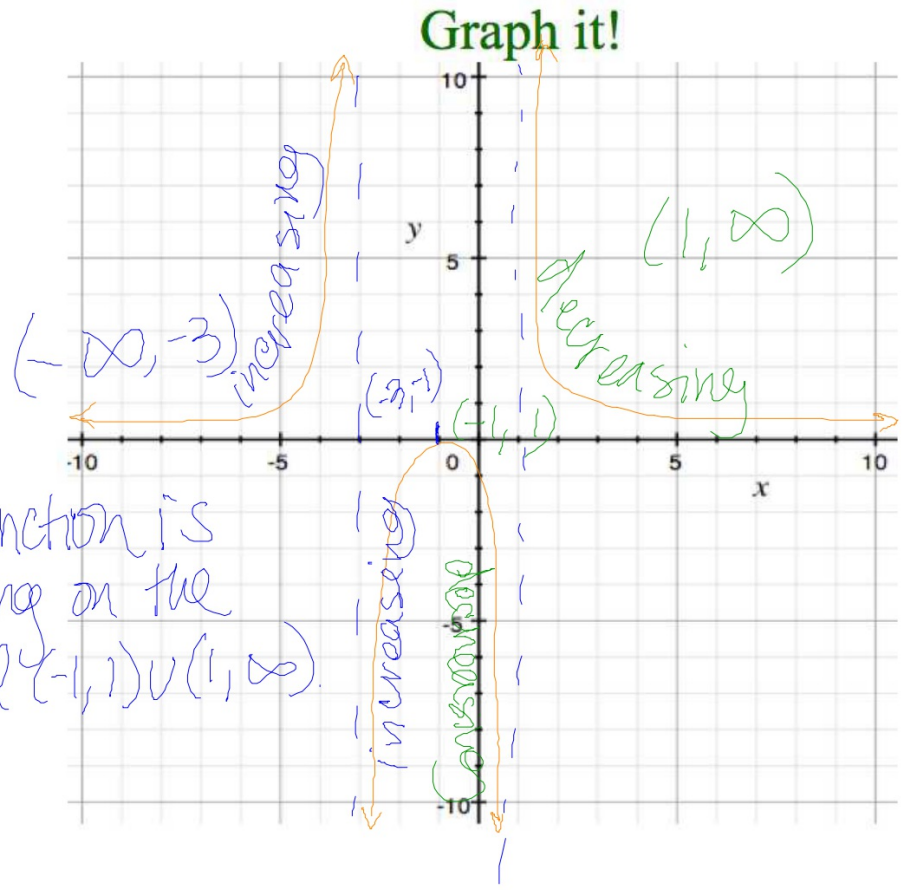

Graph it!
10
5
-5
-10
-10
-5
0
5
10
x
y
(-∞, -4)
increasing
(-4, -2)
increasing
decreasing
(-2, 0)
decreasing
(0, ∞)

AM: Find intervals of increase & decrease

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

LO: The function is _____ from ____ to ____ because as the input x _____ on this interval the y value _____; The function is _____ from ____ to ____ because as the input x _____ on this interval the y value _____; The function is _____ from ____ to ____ because as the input x _____ on this interval the y value _____.

The function is increasing on the interval $(-\infty, -3) \cup (-3, -1)$.



The function is decreasing on the interval $(-1, 1) \cup (1, \infty)$.