

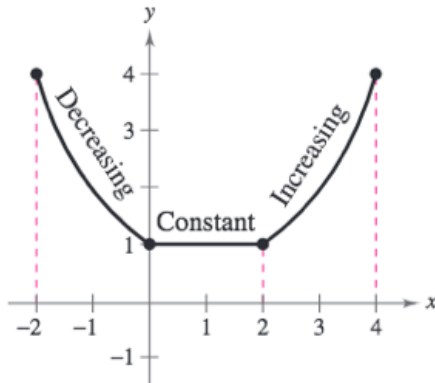
## Lesson 1.5 - Defining Increasing and Decreasing Intervals

Learning Objectives: SWBAT

- Define increasing and decreasing intervals of a function graph
- Identify the existence of relative maxima/minima of a function given its graph

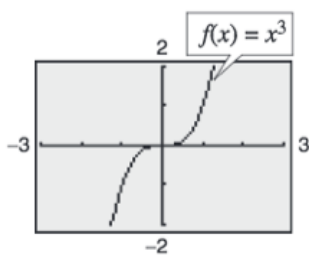
Review: **Identifying Increasing/Decreasing Intervals**

- An interval of a function is **INCREASING** if its slope is positive
- An interval of a function is **DECREASING** if its slope is negative
- An interval of a function is **CONSTANT** if its slope is zero
- Always define increasing/decreasing intervals using "x" values (look left to right)
- See the figure below for each case

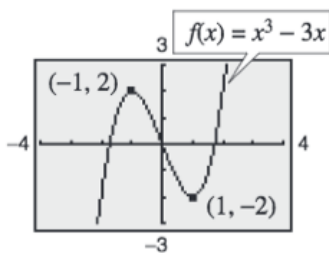


- This function is decreasing on the interval  $[-2, 0]$
- This function is constant on the interval  $[0, 2]$
- This function is increasing on the interval  $[2, 4]$

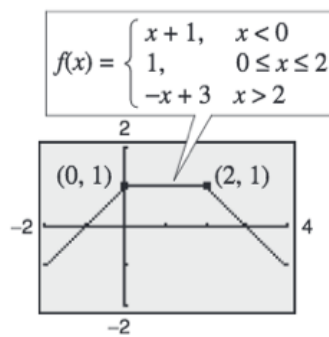
Your Turn: Define the increasing/decreasing/constant intervals for the following:



(a)



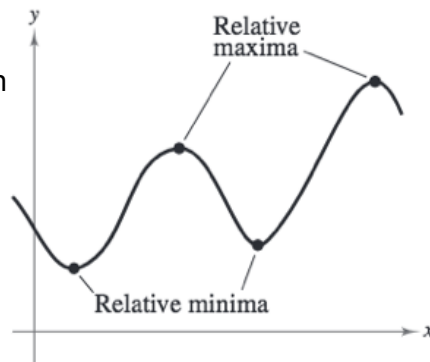
(b)



(c)

Review: **Relative Maxima/Minima**

- A relative Maxima (max) is a turning point on a graph where the slope goes from **positive to negative**.  
The slope at the point itself is zero
- A relative Minima (min) is a turning point on a graph where the slope goes from **negative to positive**.  
The slope at the point itself is zero



## Lesson 1.5 - Defining Increasing and Decreasing Intervals

Practice: Use DESMOS to graph each function. After graphing determine the intervals upon which the function is increasing, decreasing or constant

23.  $f(x) = 3$

24.  $f(x) = x$

25.  $f(x) = x^{2/3}$

27.  $f(x) = x\sqrt{x+3}$

28.  $f(x) = \sqrt{1-x}$

29.  $f(x) = |x+1| + |x-1|$

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

2)  $y = x^3 - 11x^2 + 39x - 47$

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

Practice: Use DESMOS to graph each function. After graphing use DESMOS to determine the coordinates of any relative maxima/minima

31.  $f(x) = x^2 - 6x$

32.  $f(x) = 3x^2 - 2x - 5$

33.  $y = 2x^3 + 3x^2 - 12x$

34.  $y = x^3 - 6x^2 + 15$

35.  $h(x) = (x-1)\sqrt{x}$

36.  $g(x) = x\sqrt{4-x}$

37.  $f(x) = x^2 - 4x - 5$

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

39.  $f(x) = x^3 - 3x$