Name: Date: Period:

1C: Increasing and Decreasing Functions

Notes

Def. **Increasing Function**: the value of the function increases as the value of x increases.

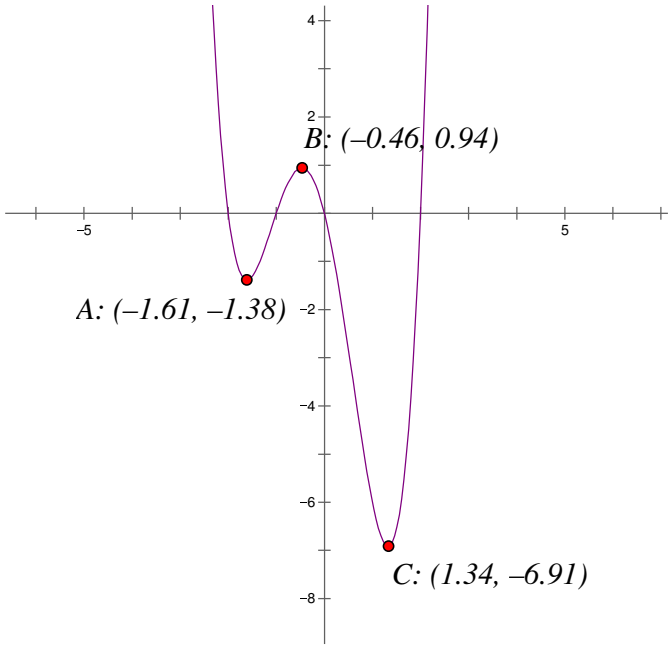
If $x_1 < x_2$ then $f(x_1) < f(x_2)$

Def. **Decreasing Function**: the value of the function decreases as the value of x increases.

If $x_1 < x_2$ then $f(x_1) > f(x_2)$

Def. **Constant function**: the value of the function does not change as the value of x increases.

If $x_1 < x_2$ then $f(x_1) = f(x_2)$



Example:

Find the intervals for which the function in the graph to the right is increasing or decreasing

Increasing on :

Decreasing on:

Example:

Find the intervals for which each function is increasing, decreasing, or constant:

a) $y = (x-3)^2$

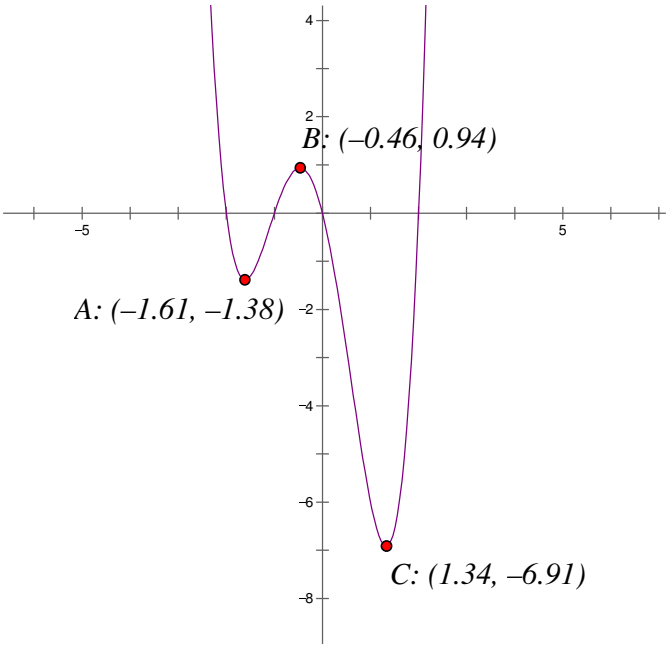
b) $y = \frac{x}{1+x^2}$

Extrema:
Many functions reveal important information at the "peaks" and "valleys" that occur in their graphs where a function changes from increasing to decreasing or vice versa. These points are called extreme values or extrema.

- If the value of an extrema is less than its neighboring points, then it is a _____.
- If the value of an extrema is greater than its neighboring points, then it is a_____.
- If the value of an extrema is less than or greater than *all* the range values of the function, then it is called a ***global minimum*** or ***global maximum*** respectively.

Example:

State whether each point in the graph to the right is a local maximum, local minimum, global maximum, or global minimum.



Example:

Use a graphing utility to find the x value (to 2 decimal places) of all local maxima and minima. Then describe the increasing and decreasing intervals.

a) $y = x^3 - x^2 - 3x$

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

Assignment

Pg. 98: 26, 27, 29, 30, 32, 33, 41, 43, 75, 76