Handout for MATH 1300 (Barsamian) Lecture L14 Thu Sep 17: Section 1.7, Part 2

Part 1: Piecewise - Defined Functions

[1] Let $f(x) = \begin{cases} 1 + x^2 & \text{for} \quad x \leq 1 \\ 2x - 3 & \text{for} \quad 1 < x \leq 4 \\ 5 & \text{for} \quad 4 < x \end{cases}$

(a) Find $f(-2)$

(b) Find $f(1)$

(c) Find $f(2)$

(d) Find $f(6)$

(e) Graph the function. Put (x, y) coordinates on all important locations.

Definition of Continuous Function (Informal Definition)

Words: Function g is continuous.

Meaning (informal definition): The graph of g has no holes, jumps, or points in the "wrong place". That is, the graph can be drawn without lifting the pencil from the page.

[2] Is the function f from problem [1] continuous?

Part 2: Increasing and Decreasing Functions

Definition of Increasing Functionand Decreasing Function

Words: Function f is increasing on the interval (a, b)

Meaning: If $a < x_1 < x_2 < b$, then $f(x_1) < f(x_2)$. That is, as you move frome left to right in the interval (a, b), the graph of f goes up.

Words: Function f is decreasing on the interval (a, b)

Meaning: If $a < x_1 < x_2 < b$, then $f(x_1) > f(x_2)$. That is, as you move frome left to right in the interval (a, b), the graph of f goes down.

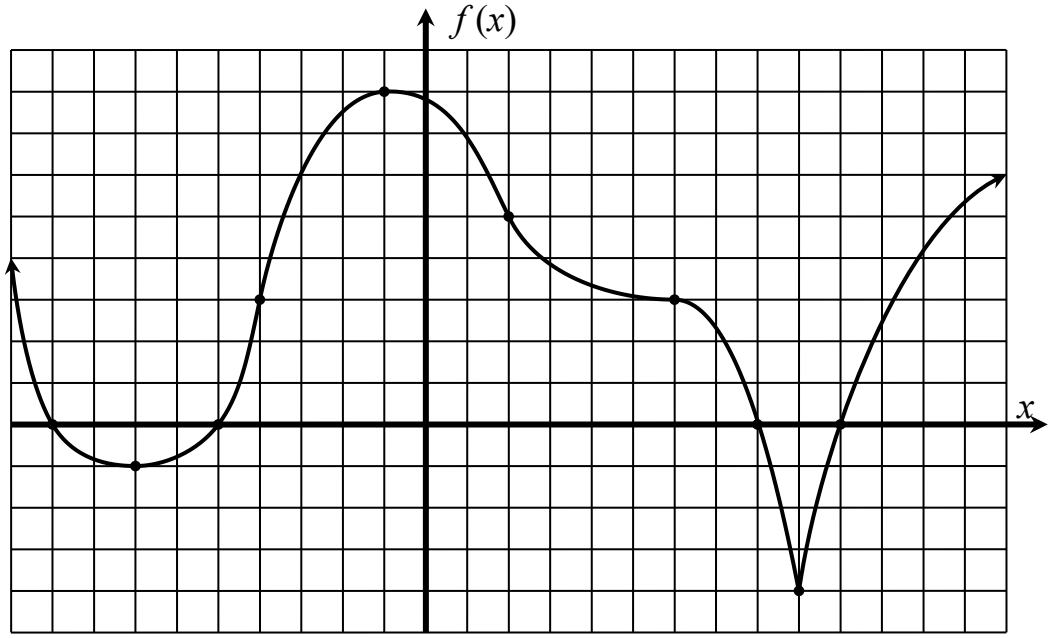
Definition of Relative Maximum and Relative Minimum Values

Words: A *realtive maximum value* of a function f.

Meaning: A number $y = f(c)$ with the property that there is an interval (a, b) contained in the domain of function f with the property that $a < c < b$ and such that $f(c) \geq f(x)$ for all x in the interval (a, b). **Remark:** A relative maximum value is a y value, not an x value.

Words: A *realtive minimum value* of a function f.

Meaning: A number $y = f(c)$ with the property that there is an interval (a, b) contained in the domain of function f with the property that $a < c < b$ and such that $f(c) \leq f(x)$ for all x in the interval (a, b). **Remark:** A relative minimum value is a y value, not an x value.



[3] (a) At which x values is $f(x)$ zero?

(b) On what intervals is $f(x)$ positive?

(c) On what intervals is $f(x)$ negative?

(d) On what intervals is f increasing?

(e) On what intervals is f decreasing?

(f) Find all the relative max values of f.

(g) Find all the relative min values of f.