

MTH 30 LECTURE NOTES (Ojakian)

Topic 3: Graph Behavior

OUTLINE

(References: 1.3)

1. Increasing and Decreasing
 2. Max and Min
 3. Note: Skipping average value
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1. Some funny words

- (a) “input” = “at” = “where” = “when”
- (b) “output” = “value”
- (c) Problem: Draw a graph and use this terminology

2. Going up and going down

- (a) Increasing: $a < b \Rightarrow f(a) < f(b)$
- (b) Decreasing: $a < b \Rightarrow f(a) > f(b)$
- (c) Do 1.3: 19, 21

3. Absolute Extrema

- (a) Absolute max. Value V at a if: $V = f(a) \geq f(x)$ for all x in the domain.
- (b) Absolute min. Value V at a if: $V = f(a) \leq f(x)$ for all x in the domain.
- (c) Do: Basic example
- (d) Problem: Consider graphs in 1.3 - 19, 21
- (e) Problem:
Find a graph with 1) no absolute extrema, 2) just an absolute max, 3) just an absolute min

4. Local Extrema

- (a) Local max. Value V at a if :
 - i. $V = f(a) \geq f(x)$ for all “nearby” x .
 - ii. $V = f(a) \geq f(x)$ for all x in some sufficiently small open interval (b, c) containing our number a .
- (b) Local min. Value V at a if :
 - i. $V = f(a) \leq f(x)$ for all “nearby” x .
 - ii. $V = f(a) \leq f(x)$ for all x in some sufficiently small open interval (b, c) containing our number a .
- (c) Note: In both cases, the function must be defined “on both sides” of a (i.e. defined on the entire open interval).
- (d) Do: Local extrema for 1.3: 19
- (e) Problem: Find a graph with no local extrema
- (f) Exercises. Section 1.3: 18 - 25
- (g) Exercises Using Desmos/Geogebra: Section 1.3: 35 - 40.