Math 150, Section 2.3

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Definition of increasing and decreasing functions

Definition

A function f is said to be increasing on an interval I if $f(x_1) < f(x_2)$ whenever $x_1 < x_2$ in I.

A function f is said to be decreasing on an interval I if $f(x_1) > f(x_2)$ whenever $x_1 < x_2$ in I.

Using a graph to find increasing and decreasing

If the function is increasing then the graph of the function will go up as we go from left to right and if the function is decreasing then the graph will go down as we go from left to right (note that we always go from left to right on the x-axis and study the change in the y-axis). Thus if we are given the graph of a function we can find its intervals of increasing and decreasing.
Try problems 2.3.3, 2.3.4, 2.3.5, 2.3.8.

Average rate of change

Definition

The **average rate of change** of a function $y = f(x)$ between $x = a$ and $x = b$ is defined as

$$\text{average rate of change} = \frac{\text{change in } y}{\text{change in } x} = \frac{f(b) - f(a)}{b - a}$$

The average rate of change is the slope of the **secant line** between $x = a$ and $x = b$ on the graph of f, that is the line that passes through $(a, (f(a))$ and $(b, f(b))$.
Try problems 2.3.19, 2.3.22, 2.3.24.