2.3 Properties of Functions

Increasing & Decreasing Functions

Where is the function increasing,
decreasing or constant?

We use strict inequalities involving the independent variable x or we use open intervals of the x coordinates: (a,b) all real #'s x for $a<x<b$

Increasing:

Decreasing:

Constant:

A function (f) is increasing on an open Interval (I) if for any choice of x_1 & x_2 in I with $x_1<x_2$ we have $f(x_1) < f(x_2)$.

decreasing: when $x_1<x_2$ and $f(x_1) < f(x_2)$

constant: for all x, the values of f(x) are equal

Look at fig. 27 on pg. 116

Local Maximum & Minimum

Even & Odd functions

A function f is even iff whenever the pt. (x,y) is on the graph of f, then the pt. (-x,y) is also on the graph. Symmetric w/ respect to the y-axis (mirror image on either side of the y-axis). $f(-x) = f(x)$

Odd iff whenever the pt. (x,y) is on the graoh of f, then the py. (-x,-y) is also on the graph. Symmetric w/ respect to the origin (reflect about the y-axis followed by a reflection about the x-axis). $f(-x) = -f(x)$

Look at ex. 6 & 7 on pg. 119 for visual examples

Identifying Even & Odd functions

Ex. 1 Algebraically (could be used as a proof)

a) $f(x) = x2 - 5$

b) $g(x) = x3 - 1$

c) $h(x) = 5x3 - x$

Average Rate of Change (also called Difference Quotient)

If c is in the domain of a function $y = f(x)$, the average rate of change of c to x is defined as:

The average rate of change of a function equals the slope of the secant line containing 2 pts. on its graph.

Slope of secant line:

Ex. 2 p.114

a) find average rate of change of $f(x) = 2x^2 - 3x$ from 1 to x

b) use results to find slope of the secant line containing (1,f(1)) & (2,f(2))

c) find equation of this secant line

d) graph f and secant line on the same viewing window