

PROPERTIES OF FUNCTIONS

Even and odd functions

Even	Odd
$f(-x) = f(x)$	$f(-x) = -f(x)$
Graph of $y = f(x)$ is symmetric around the y-axis	Graph of $y = f(x)$ is symmetric around origin

P. 238 #22, #24, #28

Which of these are even, odd, or neither?

	EVEN?	ODD?
$f(x) = x^2$		
$f(x) = x^3$		

	EVEN?	ODD?
$h(x) = 3x^3 + 5$		
$G(x) = \sqrt{x}$		

	EVEN?	ODD?
$h(x) = \frac{x}{x^2 - 1}$		

Increasing, decreasing, and constant functions

Over an interval, a function is:

Decreasing	Increasing	Constant
Goes down from left to right	Goes up from left to right	Stays the same
$x_1 < x_2 \rightarrow f(x_1) > f(x_2)$	$x_1 < x_2 \rightarrow f(x_1) < f(x_2)$	$x_1 < x_2 \rightarrow f(x_1) = f(x_2)$

p. 237 #12

p. 237 #16

LOCAL MINIMA AND MAXIMA

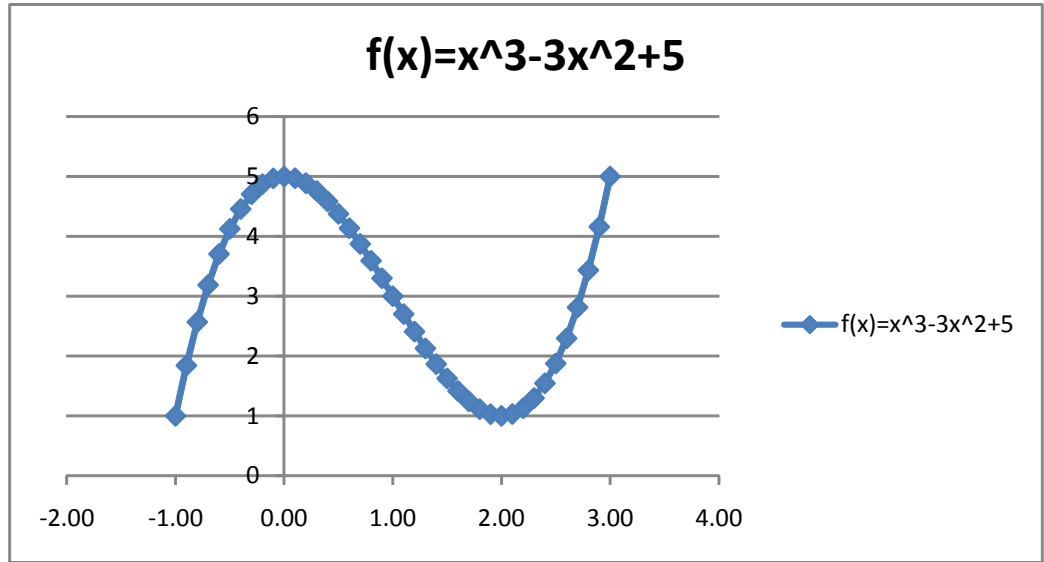
Minimum at c	Maximum at c
$f(x) > f(c)$ for $x \neq c$ in some open interval I	$f(x) < f(c)$ for $x \neq c$ in some open interval I

P. 237, #22, #24, #26

P. 238 #46 Let $f(x) = x^3 - 3x^2 + 5$ over the interval $(-1,3)$.

1. Graph the function
2. List the local maxima and minima
3. List intervals over which $f(x)$ is decreasing and increasing

x	$f(x)=x^3-3x^2+5$
-1.00	1
-0.90	1.841
-0.80	2.568
-0.70	3.187
-0.60	3.704
-0.50	4.125
-0.40	4.456
-0.30	4.703
-0.20	4.872
-0.10	4.969
0.00	5
0.10	4.971
0.20	4.888
0.30	4.757
0.40	4.584
0.50	4.375



Secant lines and average rate of change

My trip here this afternoon was 18.9 miles. I left at 4:00 and arrived at 4:45. What was my average speed?



Average rate of change:

$$\frac{\text{change in } f(x)}{\text{change in } x} = \frac{f(x) - f(c)}{x - c} = \frac{\text{change in } y}{\text{change in } x} = \text{slope of secant line}$$

p.238 #54 $f(x) = -2x^2 + 4$

Average rate of change from:

a. 0 to 2

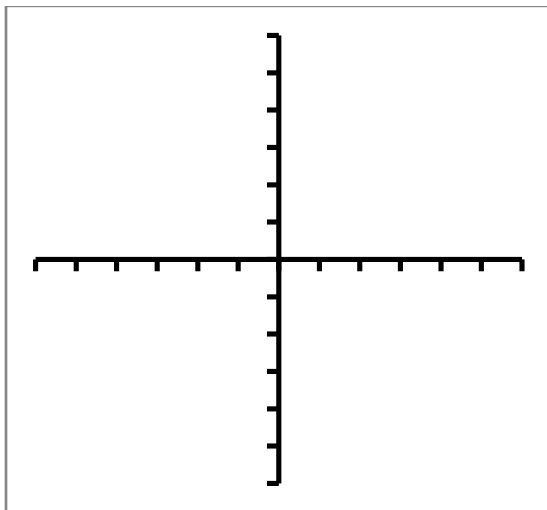
b. 1 to 3

c. 1 to 4

P. 238 #60

$$g(x) = x^2 + 1$$

- a. Find the average rate of change from -1 to x
- b. Use this to find the average rate of change from -1 to 2 .
- c. Find the equation of the secant line through the points $(-1, g(-1))$ and $(2, g(2))$.



APPLICATION:

P. 239 #64

x	$A(x)=x^2+40/x$
0.4	100.16
0.8	50.64
1.2	34.77333
1.6	27.56
2	24
2.4	22.42667
2.8	22.12571
3.2	22.74
3.6	24.07111
4	26
4.4	28.45091
4.8	31.37333
5.2	34.73231
5.6	38.50286
6	42.66667

