Pg. 86-87 due today…

#11-20

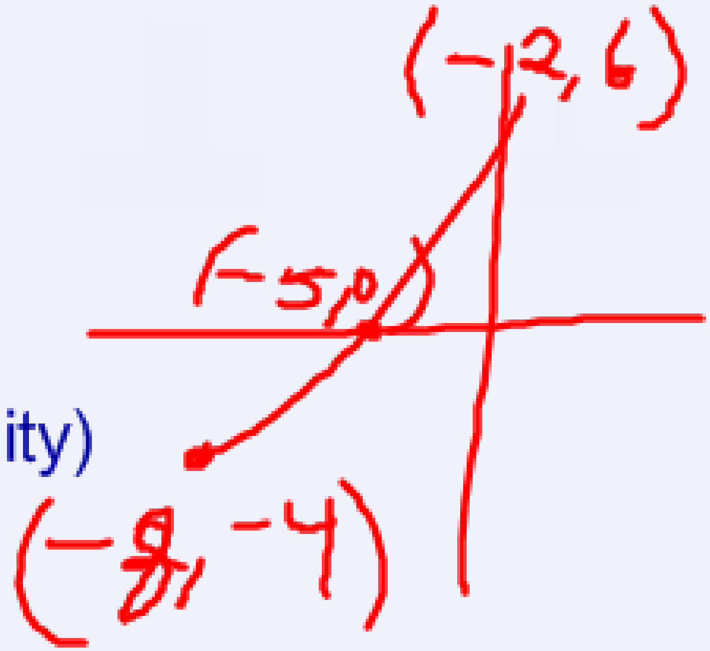
11. yes

12. no

13. no, only increasing (5,10)

14. yes

15. increasing: (-8, -2) (0,2) (5, infinity)



16. decreasing: (neg. infinity, -8) (-2,0) (2,5)

17. yes, f(2)=10

18. ~~yes, f(5)=0~~ NO

19. maximum at: -2 & 2

f(-2)=6, f(2)=10

20. minimum at: -8, 0, & 5

f(-8)=-4, f(0)=0, & f(5)=0

Sections 2.3C

Properties of Functions

OBJECTIVE 5

USING A GRAPHING CALCULATOR TO APPROXIMATE A LOCAL MINIMA AND MAXIMA

Example...

Using a graphing calculator to approximate a local Minima and maxima

Use a graphing utility to graph $f(x) = 2x^3 - 3x + 1$ for $-2 < x < 2$
Approximate where f has any local maxima or local minima

minimum: $f(.7) = -.4$

maximum: $f(-.7) = 2.4$

OBJECTIVE 6

FIND THE AVERAGE RATE OF CHANGE OF A FUNCTION

If a and b, $a \neq b$, are in the domain of a function $y = f(x)$, the **average rate of change of f** from a to b is defined as

$$\text{Average rate of change} = \frac{\Delta y}{\Delta x} = \frac{f(b) - f(a)}{b - a} \qquad a \neq b \qquad \textbf{(1)}$$

Example...

Finding the Average Rate of Change

slope. → $\dfrac{\Delta y}{\Delta x} = \dfrac{f(b) - f(a)}{b - a}$

Find the average rate of change of $f(x) = \frac{1}{2}x^2$

from 0 to 1 (a = 0, b = 1)

$$\frac{f(1) - f(0)}{1-0}$$

$$\frac{\frac{1}{2}(1)^2 - \left(\frac{1}{2}(0)^2\right)}{1-0}$$

$$\frac{\frac{1}{2} - 0}{1-0} = \frac{\frac{1}{2}}{1} = \boxed{\frac{1}{2}}$$

from 0 to 3 (a = 0, b = 3)

$$\frac{f(3) - f(0)}{3-0}$$

$$\frac{\frac{1}{2}(3)^2 - \left(\frac{1}{2}(0)^2\right)}{3-0}$$

$$\frac{\frac{9}{2} - 0}{3-0} = \frac{\frac{9}{2}}{3} = \frac{9}{6} = \boxed{\frac{3}{2}}$$

from 0 to 5

$$f(x) = \frac{1}{2}x^2$$

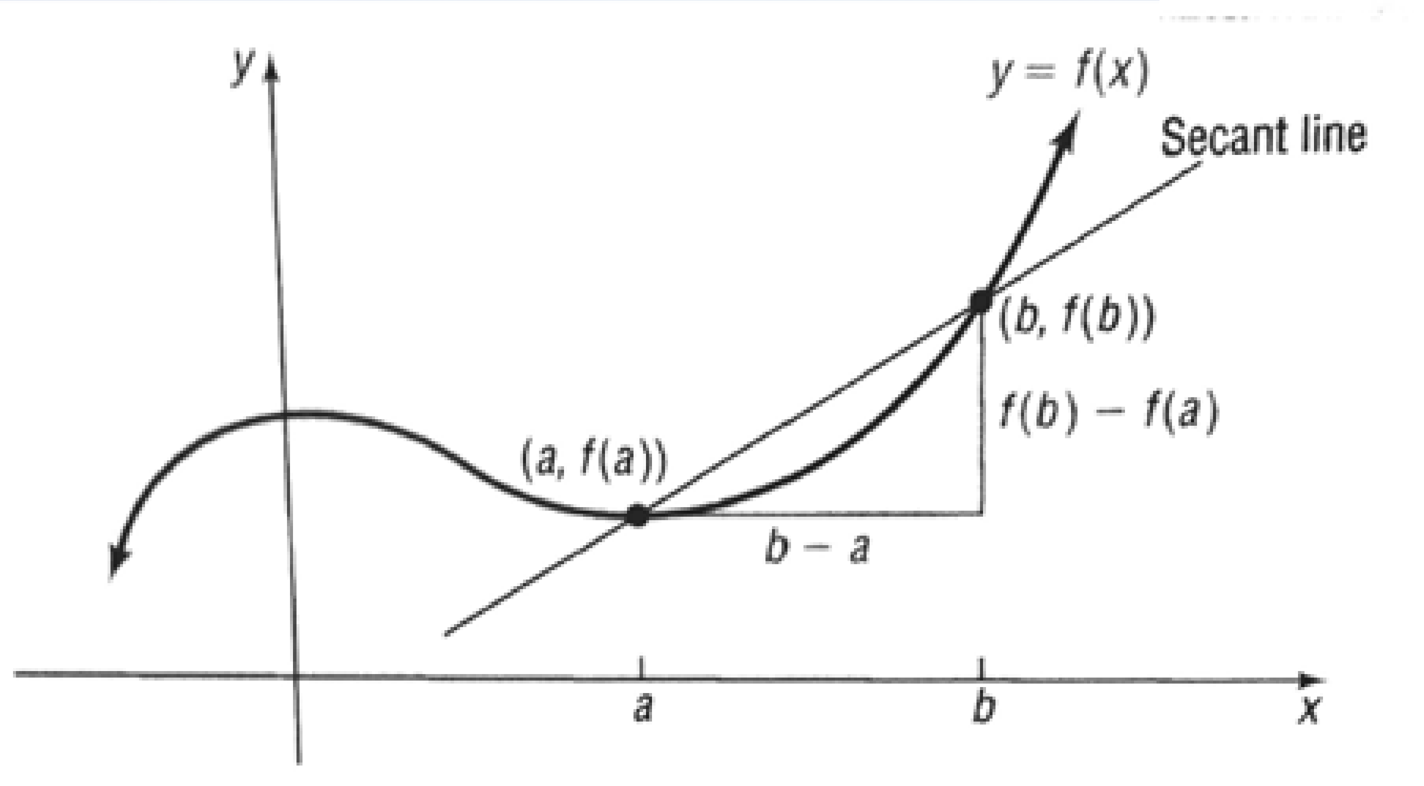
0 to 5

$$\frac{f(b)-f(a)}{b-a} = \frac{f(5)-f(0)}{5-0} = \frac{\frac{25}{2}-0}{5-0}$$

$$\frac{\frac{25}{2}}{5} = \frac{25}{2} \div \frac{5}{1} = \frac{25}{2} \cdot \frac{1}{5} = \frac{25}{10} = \boxed{\frac{5}{2}}$$

The Secant Line

$m_{sec} = \dfrac{\Delta y}{\Delta x} = \dfrac{f(b) - f(a)}{b - a}$



Theorem: equation of line: $y = mx + b$

Slope of the Secant Line

The average rate of change of a function from a to b equals the slope of the secant line containing two points $(a, f(a))$ and $(b, f(b))$ on its graph.

Example...

Finding the Equation of a Secant Line

Suppose that $g(x) = 3x^2 - 2x + 3$.

(a) Find the average rate of change of g from -2 to 1.

$$\frac{f(b) - f(a)}{b - a}$$

$$\frac{f(1) - f(-2)}{1 - (-2)} = \frac{4 - (19)}{1 - (-2)} = \frac{-15}{3}$$

$$m = -5$$

Suppose that $g(x) = 3x^2 - 2x + 3$.

(b) Find an equation of the secant line containing $(-2, g(-2))$ and $(1, g(1))$.

$m = -5$

$y = mx + b$

$g(-2) = -5(-2) + b$

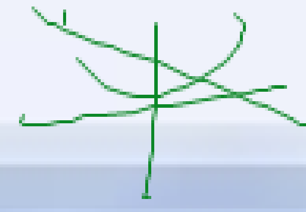
$19 = 10 + b$

$-10 \quad -10$

$9 = b$

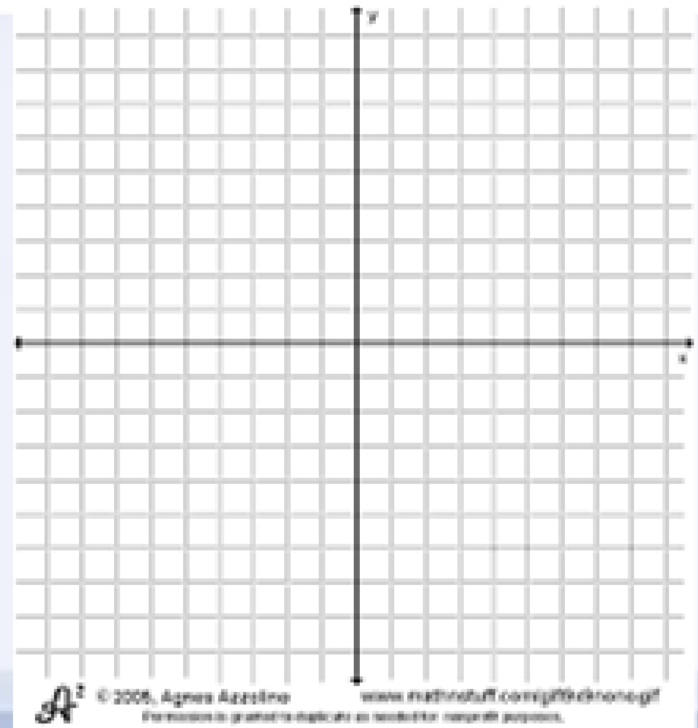
$y = mx +$

$y = -5x + 9$



Suppose that $g(x) = 3x^2 - 2x + 3$.

(c) Using a graphing utility, draw the graph of g and the secant line obtained in part (b) on the same screen.



Pg. 88

#58 & 59