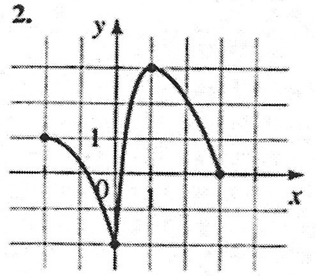
Notes Section 3.3

I can determine the intervals, which a function is increasing and decreasing. (Given a graph)

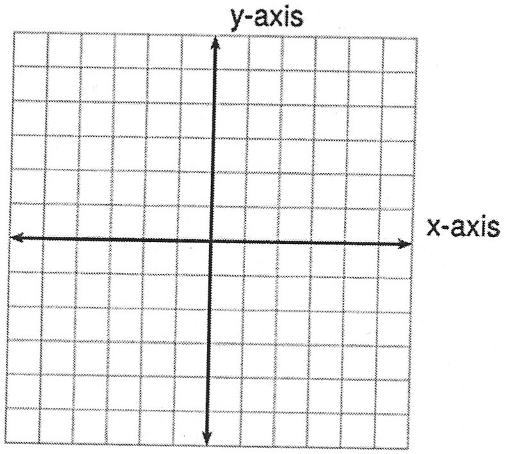
2.



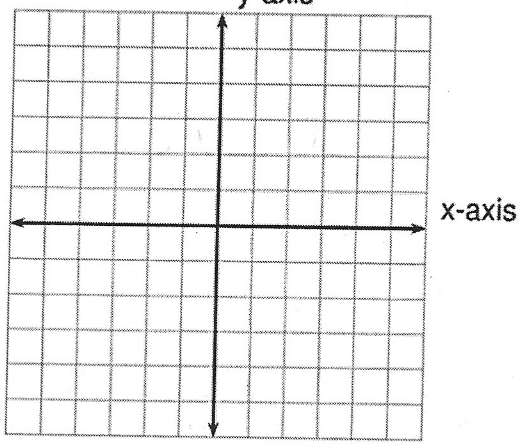
5-12 A function *f* is given. (a) use a graphing calculator to graph *f*

(b) State approximately the intervals on which f is increasing and decreasing.

6. $f(x) = 4 - x^{2/3}$

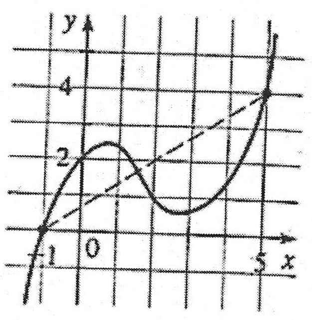


8. $f(x) = x^3 - 4x$



I can determine the average rate of change of *f* between two points. Given a graph and an equation

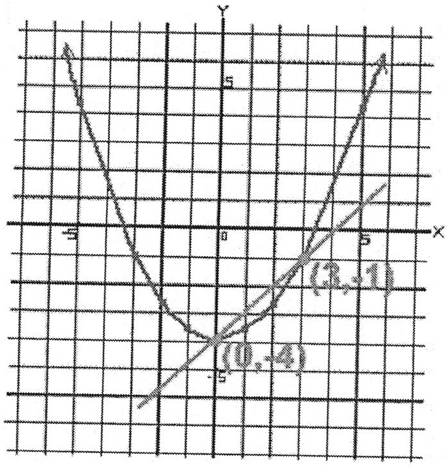
16.



$$A(x) = \frac{f(x) - f(a)}{x - a}$$

- A is the name of this average rate of change function
- x - a represents the change in the input of the function f
- f(x) - f(a) represents the change in the function f as the input changes from a to x

Find the slope of the line going through the curve $f(x)=\frac{1}{3}x^2-4$ as x changes from 3 to 0.



Let $f(x) = 3x - 5$. Find the average rate of change of f between the following points.

x = 0 and x = 1

x = 3 and x = 7

x = a and x = a + h

20. $f(z) = 1 - 3z^2;\quad z = -2,\ z = 0$

21. $f(x) = x^3 - 4x^2;\quad x = 0,\ x = 10$

24. $f(z) = 4 - x^2;\quad x = 1,\ x = 1 + h$

29-30 A linear function is given.

(a) Find the average rate of change of the function between $x = a$ and $x = a + h$

(b) Show that the average rate of change is the same as the slope of the line.

30. $g(x) = -4x + 2$

29. $f(x) = \frac{1}{2}x + 3$

Notes Section 3.3

I can determine the intervals, which a function is increasing and decreasing. (Given a graph)

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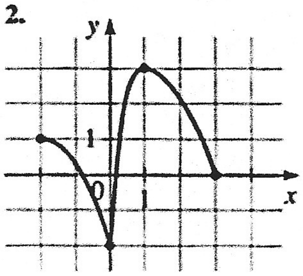


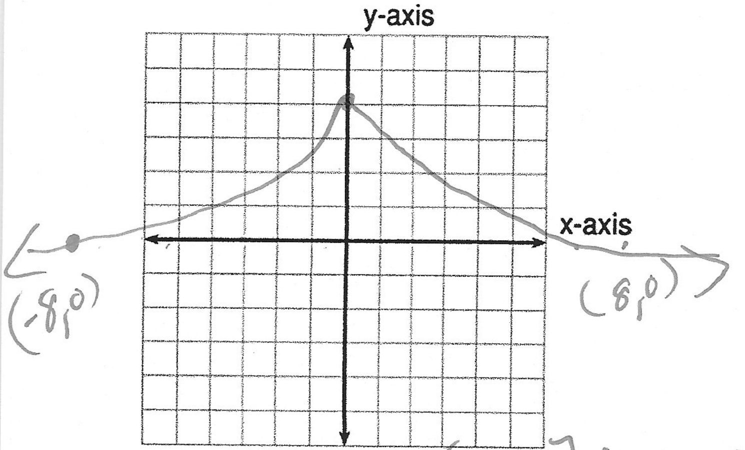
Decreasing: $[-2,0]$, $[1,3]$

Increasing: $[0,1]$

5-12 A function f is given. (a) use a graphing calculator to graph f

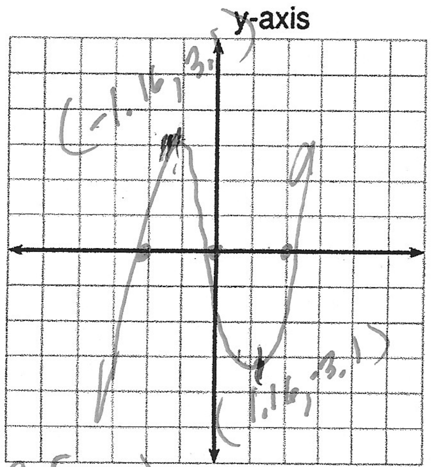
(b) State approximately the intervals on which f is increasing and decreasing.

6. $f(x) = 4 - x^{2/3}$



Increasing $(-\infty,0]$ Decreasing $[0,\infty)$

8. $f(x) = x^3 - 4x$



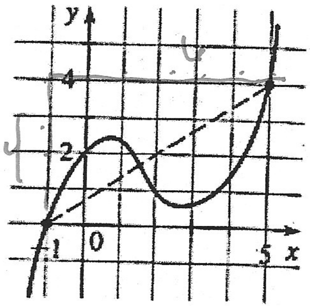
I $[-\infty, -1.16]$

$[1.16, \infty)$

D: $[-1.16, 1.16]$

I can determine the average rate of change of f between two points. Given a graph and an equation

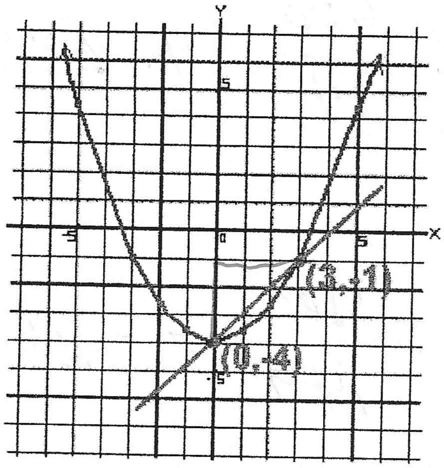
16.



$\frac{4}{6} = \frac{2}{3}$

$$A(x) = \frac{f(x) - f(a)}{x - a} = \frac{\text{change in function}}{\text{change in x-values}}$$

Find the slope of the line going through the curve $f(x)=\frac{1}{3}x^2-4$ as x changes from 3 to 0.



$\frac{3}{+3}=+1$ or $\frac{f(3)-f(0)}{3-0}=\frac{-1-(-4)}{3}$

$=\frac{3}{3}=1$

Let $f(x) = 3x - 5$. Find the average rate of change of f between the following points.

x = 0 and x = 1 $\quad \frac{f(1)-f(0)}{1-0}=\frac{-2-(-5)}{1}=\boxed{3}$

$f(a+h)$
$=3(a+h)-5$
$3a+3h-5$

x = 3 and x = 7 $\quad \frac{f(7)-f(3)}{7-3}=\frac{16-4}{4}=\frac{12}{4}=\boxed{3}$

x = a and x = a + h $\quad \frac{f(a+h)-f(a)}{a+h-a}=\frac{3a+3h-5-(3a-5)}{h}$

$=\frac{3h}{h}=3$

20. $f(z) = 1 - 3z^2; \quad z = -2, \ z = 0$

$f(0)=1$
$f(-2)=1-3(4)$
$=-11$

$\frac{f(0)-f(-2)}{0-(-2)}=\frac{1-(-11)}{2}=\boxed{6}$

21. $f(x) = x^3 - 4x^2; \quad x = 0, \ x = 10$

$f(10)=1000-400=600$
$f(0)=0$

$\frac{f(10)-f(0)}{10-0}=\frac{600-0}{10}=\boxed{60}$

24. $f(z) = 4 - x^2; \quad x = 1, \ x = 1 + h$

$f(1)=4-1=3 \quad f(1+h)=4-(1+2h+h^2)$

$\frac{f(1+h)-f(1)}{1+h-1}=\frac{-h^2-2h+3-3}{h}$

$=\frac{-h^2-2h}{h}$

$=-h-2$

29-30 A linear function is given.

(a) Find the average rate of change of the function between $x = a$ and $x = a + h$

(b) Show that the average rate of change is the same as the slope of the line.

$f(a+h)=-4(a+h)+2-(-4a+2)$
$-4a-4h+2+4a-2$

$f(a+h)=\frac{1}{2}(a+h)+3=\frac{1}{2}a+\frac{1}{2}h+3$
$f(a)=\frac{1}{2}a+3$

30. $g(x) = -4x + 2$

29. $f(x) = \frac{1}{2}x + 3$

$\frac{f(a+h)-f(a)}{a+h-a}=\frac{-4h}{h}=-4$

$\frac{f(a+h)-f(a)}{a+h-a}=\frac{\frac{1}{2}a+\frac{1}{2}h+3-(\frac{1}{2}a+3)}{h}$

$=\frac{1}{2}$