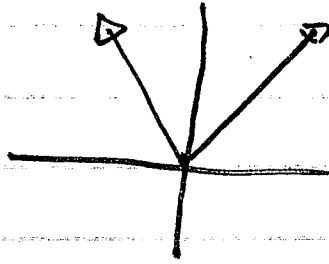


4.1

$$y = |x|$$



$$y = \begin{cases} -x, & x \leq 0 \\ x, & x > 0 \end{cases}$$

$$|x-2| = 4$$

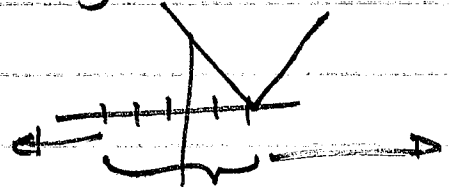
$$x-2 = 4 \quad -(x-2) = 4$$

$$y' = \begin{cases} -1, & x < 0 \\ 1, & x > 0 \end{cases}$$

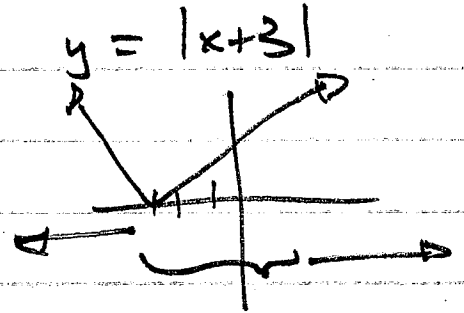
31)  $f(x) = |x-2| + |x+3|$

$$y = |x-2|$$

$$f(x) = \begin{cases} -(x-2) - (x+3) & x < -3 \\ -(x-2) + (x+3) & -3 \leq x \leq 2 \\ (x-2) + (x+3) & x > 2 \end{cases}$$



$$f(x) = \begin{cases} -2x - 1, & x < -3 \\ 5, & -3 \leq x \leq 2 \\ 2x + 1, & x > 2 \end{cases}$$



$$f'(x) = \begin{cases} -2, & x < -3 \\ 0, & -3 < x < 2 \\ 2, & x > 2 \end{cases}$$

$$[-5, 5]$$

$$f(-5) = |-7| + |-2| = 9$$

$$f(-3) = |-5| + |0| = 5$$

$$f(2) = |0| + |5| = 5$$

$$f(5) = |3| + |8| = 11$$

4.1

$$29) y = \frac{x^f}{x^2+1} g$$

$$y' = \frac{(x^2+1) \cdot 2x(x)}{(x^2+1)^2}$$

~~UNDEFINED~~

$$(x^2+1)^2 = 0$$

(ZERO)

$$x^2+1-2x^2$$

$$-x^2+1=0$$

$$1=x^2$$

$$\pm 1 = x$$

$$y = \frac{1}{1^2+1} = \frac{1}{2}$$

$$y = \frac{-1}{(-1)^2+1} = -\frac{1}{2}$$

$$25) y = \sqrt{1-x^2}$$

$$y = (1-x^2)^{-1/2}$$

$$y' = -\frac{1}{2}(1-x^2)^{-3/2} [-2x]$$

$$= \frac{x}{(1-x^2)^{3/2}}$$

$$(1-x^2)^{3/2} = 0$$

$$x = \pm 1$$

$$x = 0$$

$$y(-1) = \infty$$

$$y(0) = 1$$

$$y(1) = \infty$$

$$43) V(x) = x(10-2x)(16-2x)$$

$$0 < x < 5$$

$$= x(160-20x-32x+4x^2)$$

$$= 160x - 20x^2 - 32x^2 + 4x^3$$

$$= 160x - 52x^2 + 4x^3$$

$$V'(x) = 160 - 104x + 12x^2 = 0$$

$$x = 2$$

4.1

35)  $y = x^{2/3} (x+2)$

$y = x^{5/3} + 2x^{2/3}$

$y' = \frac{5}{3}x^{2/3} + \frac{4}{3}x^{-1/3}$

$y(-.8) = 1.03$  LOCAL MAX

$y(0) = 0$  LOCAL MIN

25)  $y = \sqrt{1-x^2}$

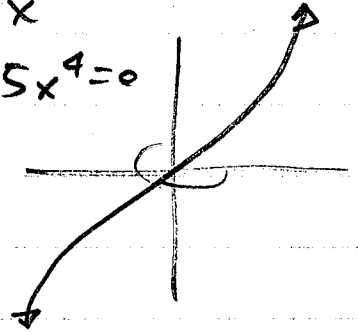
$y = (1-x^2)^{1/2}$

$y' = -\frac{1}{2}(1-x^2)^{-1/2} [-2x]$

$= x(1-x^2)^{-1/2}$

(0,1) LOCAL/GLOBAL MIN

$y = x^5$   
 $y' = 5x^4 = 0$



31)  $f(x) = |x-2| + |x+3|$ ,  $[-5, 5]$   $y = |x|$

$f(x) = \begin{cases} -(x-2) - (x+3), & x < -3 \\ -(x-2) + (x+3), & -3 \leq x \leq 2 \\ x-2 + x+3, & x > 2 \end{cases}$

$f(x) = \begin{cases} -2x - 5, & x < -3 \\ 5, & -3 \leq x \leq 2 \\ 2x + 1, & x > 2 \end{cases}$

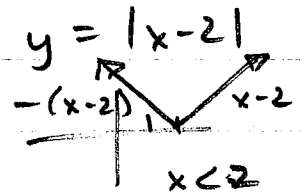
$f'(x) = \begin{cases} -2, & x < -3 \\ 0, & -3 \leq x \leq 2 \\ 2, & x > 2 \end{cases}$

$f(-5) = 9$

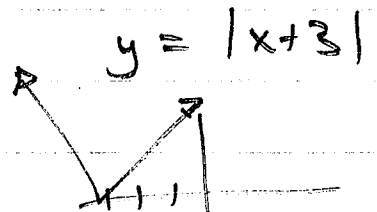
$f(-3) = 5$

$f(5) = 11$

$f(2) = 5$



$y = \begin{cases} -(x-2), & x \leq 2 \\ x-2, & x > 2 \end{cases}$



$y = \begin{cases} -(x+3), & x < -3 \\ x+3, & x \geq -3 \end{cases}$

LOCAL/GLOBAL MAX (5, 11)

GLOBAL MIN = 5

LOCAL MAX (-5, 9)

4.1

15)  $F(x) = \sin(x + \frac{\pi}{4}) \quad [0, \frac{7\pi}{4}]$

$f'(x) = \cos(x + \frac{\pi}{4}) = 0$

$f(0) = .707$

$f(.785) = 1$

$f(3.927) = -1$

$f(\frac{7\pi}{4}) = 0$

GLOBAL MAX  $(.785, 1)$ ,  ~~$(\frac{7\pi}{4}, 0)$~~

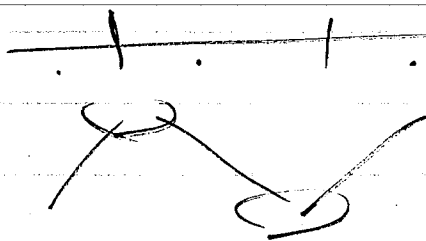
LOCAL MAX " "

GLOBAL MIN  $(3.927, -1)$

LOCAL MIN " "

LOCAL MIN  $(0, .707)$

LOCAL MAX  $(\frac{7\pi}{4}, 0)$



11)  $f(x) = \frac{1}{x} + \ln x \quad [.5, 4]$

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

$x = 1, x \neq 0$

$x^{-1}$

$-x^{-2}$

$f(.5) = 1.306$

LOCAL MIN / GLOBAL MIN  $(1, 1)$

$f(1) = 1$

LOCAL MAX / GLOBAL MAX  $(4, 1.636)$

$f(4) = 1.636$

LOCAL MAX  $(.5, 1.306)$

17)  $f(x) = x^{2/5} \quad [-3, 1]$

$f'(x) = \frac{2}{5} x^{-3/5} = 0$

$\frac{2}{5} x^{-3/5} = 0 \quad x \neq 0$

$f(-3) \approx 1.552$

LOCAL / GLOBAL MAX  $(-3, 1.552)$

$f(0) = 0$

LOCAL / GLOBAL MIN  $(0, 0)$

$f(1) = 1$

LOCAL MAX  $(1, 1)$