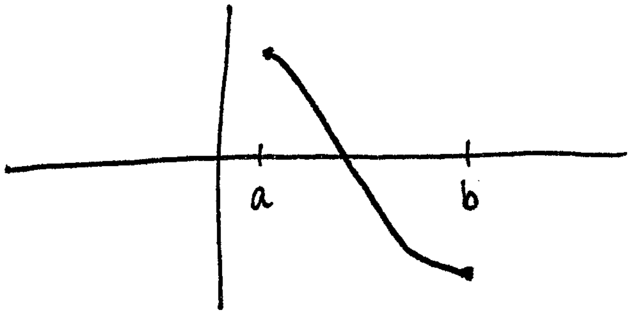
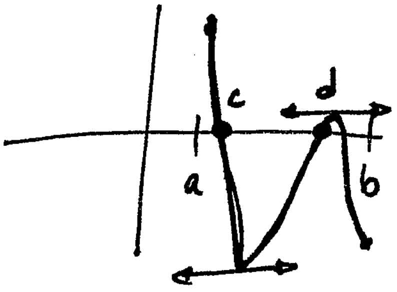
4.2

47)





x y

9) [.5, 2] $f(x) = x + \frac{1}{x}$ (.5, 2.5)

(2, 2.5)

.5 + 2

$2 + \frac{1}{2}$ $y = 2.5$

$f'(x) = 1 - \frac{1}{x^2} = 0$ $x = 1$ $f(1) = 1 + \frac{1}{1} = 2$

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

$x^2 = 1$

$x = \pm 1$ $\boxed{y=2}$

$x \leq 4$

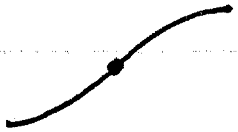
f g

23) $f(x) = x\sqrt{4-x} = x(4-x)^{1/2}$

$f'(x) = (4-x)^{1/2} + \frac{1}{2}(4-x)^{-1/2}[-1]x$

$= (4-x)^{-1/2}\left[(4-x) - \frac{1}{2}x\right]$

$= \frac{4 - \frac{3}{2}x}{\sqrt{4-x}}$

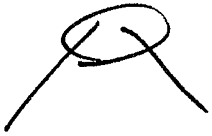


INCR. | DECR. | 0

\+ | −

0 | 3 | 4

$\frac{8}{3}$



$4 - \frac{3}{2}x = 0$ $\sqrt{4-x} = 0$

$4 = \frac{3}{2}x$ $4 - x = 0$

$\frac{8}{3} = x$ $4 = x$

INCREASING: $(-\infty, \frac{8}{3})$

DECREASING: $(\frac{8}{3}, 4)$

[ ]   ( )

4.2

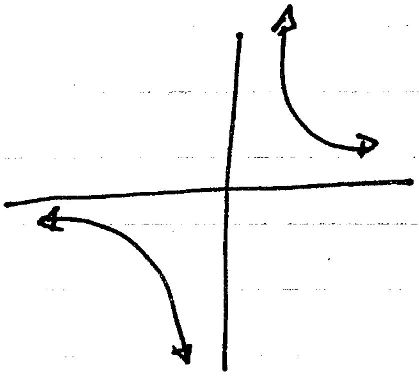
17) $h(x) = \frac{2}{x}$

$h'(x) = \frac{-2}{x^2}$ $x^2 = 0$

$x = 0$

DECR	DECR
−	−
−1	1

0



27) $f(x) = x^3 - 2x - 2\cos x$

$f'(x) = 3x^2 - 2$ [illegible] $+ 2\sin x = 0$

INCR	DECR	INCR
+	−	+
−2	0	1

−1.126   .559

21) $y = 4 - \sqrt{x+2} = 4 - (x+2)^{1/2}$

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

$= \frac{-1}{2\sqrt{x+2}}$

$2\sqrt{x+2} = 0$

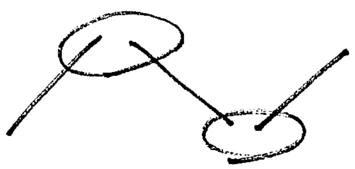
$\sqrt{x+2} = 0$

$x + 2 = 0$

$x = -2$

4.2

25) $h(x) = \frac{\overset{f}{-x}}{\underset{g}{x^2+4}}$



FDT

INCR	DECR	INCR
+	−	+
−3	0	3

−2 2

−13 +18 +2x² +

$$h'(x) = \frac{-(x^2+4) - 2x(-x)}{(x^2+4)^2} = 0$$

$-(x^2+4) - 2x(-x) = 0$

$-x^2 - 4 + 2x^2 = 0$

$x^2 - 4 = 0$

$x^2 = 4$

$x = \pm 2$

$(x^2+4)^2 = 0$

$x^2 + 4 = 0$

$x^2 = -4$

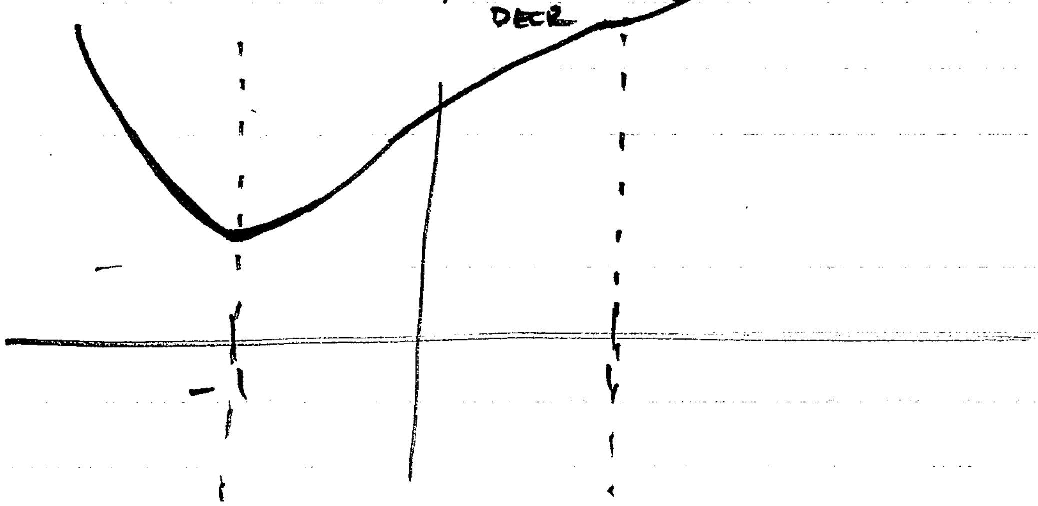
(a) There is a local max @ x = −2 because the graph
→ changes from increasing to decreasing.

the first

derivative changes sign from positive to negative.

41) $f'(-1) = f'(1) = 0$ $\overset{\text{INCR}}{f'(x) > 0}$ on $(-1,1)$ $\overset{\text{INCR}}{f'(x) > 0}$ $x > 1$

$\underset{\text{DECR}}{f'(x) < 0}$ ~~on~~ $x < -1$



4.2

9) $f(x) = x + \frac{1}{x}$ $\quad x^{-1}$ $\quad .5 \le x \le 2$

(a) secant line
(b) tangent line parallel

$$\frac{f(b) - f(a)}{b - a} \qquad y - 2\tfrac{1}{2} = 0\cancel{(x-2)}$$

$$\frac{\left[2 + \frac{1}{2}\right] - \left[\frac{1}{2} + 2\right]}{2 - \frac{1}{2}} = 0$$

(a) $\boxed{y = 2\tfrac{1}{2}}$

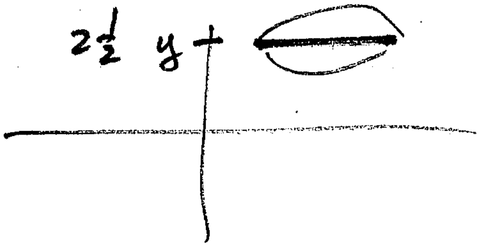
(b) $f'(x) = 1 + \frac{-1}{x^2} = 0$

$1 = \frac{1}{x^2}$

$x^2 = 1$

$x = \pm 1$

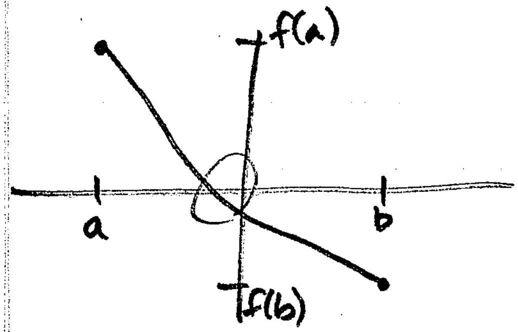
$c = 1$ $\quad (1, 2)$ $\quad m = 0$



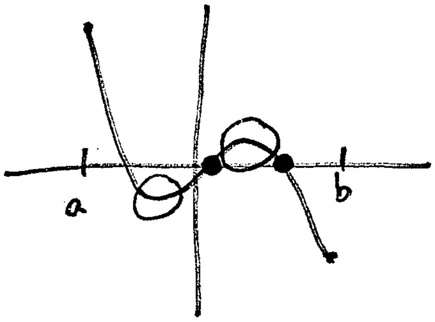
$f(1) = 1 + \frac{1}{1} = 2$

$\boxed{y = 2}$ $\qquad y - 2 = 0\cancel{(x-1)}$

47)



$f' \neq 0$



IF THERE ARE TWO ZEROES, THE SLOPE OF THEIR SECANT LINE WOULD BE ZERO. SINCE THE FUNCTION IS CONTINUOUS & DIFFERENTIABLE ON THIS INTERVAL, THE MVT GUARETEES $f' = 0$ ON THE INTERVAL. THIS IS EXCLUDED IN THE PROBLEM.

4.2

1) $f(x) = x^2 + 2x - 1$, $[0,1]$

$f'(x) = 2x + 2$

$$\frac{f(b)-f(a)}{b-a} = \frac{[1^2+2(1)-1]-[-1]}{1-0}$$

$$= 3$$

$2x + 2 = 3$

$2x = 1$

$x = \frac{1}{2}$

$$\boxed{c = \frac{1}{2}}$$