$\bar{x} = 21.4/30$ Mark time (30 min allowed).
used 20
First left after 123

MATH 131
Quiz VII
October 27, 1989

Name Key

1. Find the (absolute) maximum and minimum values of the function $f(x) = x^3 + 3x^2 + 1$, for $x \geq -1$, if they exist.

9

$f'(x) = 3x^2 + 6x = 0$

$3x(x+2)$

$x = 0, \cancel{-2}$

$x > 0 \quad f' > 0$

$f(-1) = -1 + 3 + 1 = 3$

$f(0) = 1$

MIN is 1

NO MAX

10 got 21

units a problem

1/2 all

2. We can sell 110,000 boxes of cereal at \$1.50. For each penny we raise the price we estimate that demand will drop by 500 boxes. What price will maximize total revenue?

9

p = price per box in cents

R = total revenue

q = quantity

$q = 110{,}000$ when $p = 150$

for $p \geq 150$ $\quad q = 110{,}000 - 500(p - 150)$

$= 110{,}000 - 500p + 75{,}000$

$= 185{,}000 - 500p$

$R = pq = p(185{,}000 - 500p)$

$= 185{,}000p - 500p^2$

$\frac{dR}{dp} = 185{,}000 - 1000p = 0$

$p = 185$

$\frac{d^2R}{dp^2} = -1000$ no cc down

MAX

$\boxed{\$1.85}$

many to here after 10

3. Carefully sketch the graph of
$y = \frac{9x - 18}{x^2}$

6 1/3 got all

Give coordinates or equations (and plot) of (if any)
zeros: $x = 2$
Vertical asymptotes: $x = 0$
horizontal asymptotes: $y = 0$
local maxima and minima: max $x = (4, 9/8)$
points of inflection:

$\lim_{x \to \pm\infty} \frac{9x - 18}{x^2} = 0$

$y = 9x^{-1} - 18x^{-2}$

~~$\frac{dy}{dx} = -9x^{-2} + 36x^{-3}$~~

$\frac{dy}{dx} = \frac{x^2(9) - (9x-18)2x}{x^4}$

$= \frac{x[9x - (9x-18)2]}{x^4}$

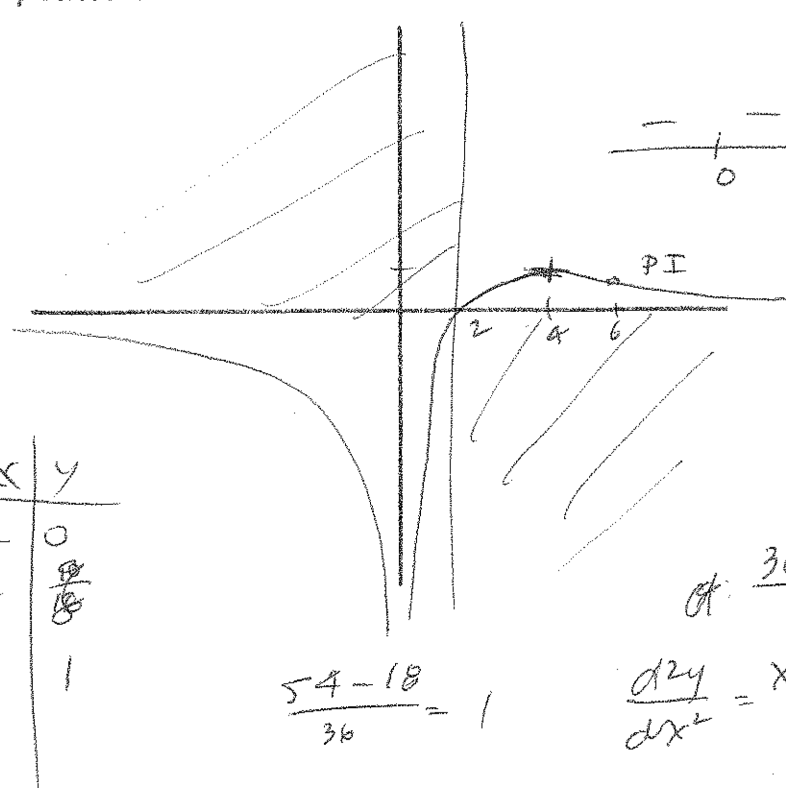
$= \frac{x[36 - 9x]}{x^4}$

$x = 4$ C.P.

$y = \frac{36 - 18}{16}$

$= \frac{18}{16}$

− − +
0 2



x	y
2	0
4	18/16
6	1

$\frac{54 - 18}{36} = 1$

$\frac{d^2y}{dx^2}$ of $\frac{36 - 9x}{x^3}$

$\frac{d^2y}{dx^2} = \frac{x^3(-9) - (36 - 9x)3x^2}{x^6}$

$3x^2(-3x - (36 - 9x)) = 3x^2(6x - 36)$

P.I.