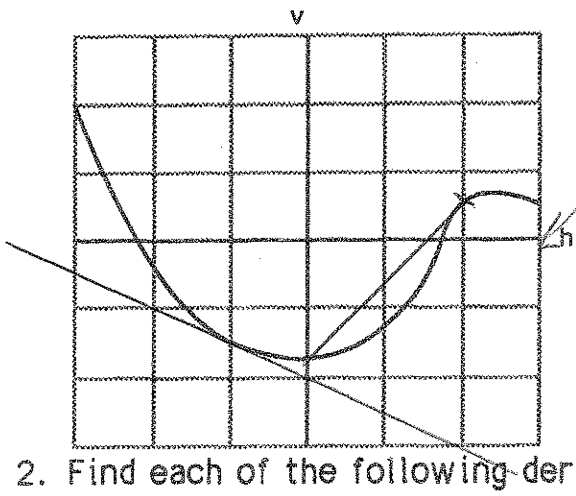
MATH 131
Quiz III
September 22, 1989

med 27
$\bar{x}$ 26.8

Name Key

(5) 1. The graph below gives v as a function of h. Carefully estimate:
a. The average rate of change of v with respect to h for $0 \le h \le 2$.
b. The instantaneous rate of change at ~~x~~ h = -1.

~~give~~ units



hard to see

a. (2, .6) (0, -1.7)

$\frac{-1.7 - .6}{0-2} = \frac{-2.3}{-2} = 1.15$

b. (-1, -1.5) (2, -3)

$\frac{-3-(-1.5)}{2-(-1)} = \frac{-1.5}{3} = -.5$

(20) 2. Find each of the following derivatives. Do NOT simplify.

a. $f(x) = 30x^5 - 20x^4 - 3\sqrt{x} + \frac{2}{x^2}$, $= 30x^5 - 20x^4 - 3x^{1/2} + 2x^{-2}$

$f'(x) = 150x^4 - 80x^3 - \frac{3}{2}x^{-1/2} - 4x^{-3} = 150x^4 - 80x^3 - \frac{3}{2\sqrt{x}} - \frac{4}{x^3}$

b. $y = (x^4 - 20x^3 + x - 20)(2x^5 + x^4 - x^3 - 10)$,

$\frac{dy}{dx} = (x^4 - 20x^3 + x \cancel{-20})(10x^4 + 4x^3 - 3x^2 + 0)$

$+ (2x^5 + x^4 - x^3 - 10)(4x^3 - 60x^2 + 1 + 0)$ must

c. $f(x) = \frac{x-2}{x^2+x+4}$,

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

d. $f(x) = 20x^4 - x^2 + x - 10$,

$f''(x) =$

$f'(x) = 80x^3 - 2x + 1$

$f''(x) = 240x^2 - 2$

(5) 3. Find the equation of the straight line which is tangent to the curve $y = 2x^3 - 4x + 3$ at $x = -1$

$y' = 6x^2 - 4$

at $x = -1$ $y' = 6(-1)^2 - 4 = 2$

$y = 2(-1)^3 - 4(-1) + 3 = -2 + 4 + 3 = 5$

$(-1, 5)$ $m = 2$

$y - 5 = 2(x+1)$

$y - 5 = 2x + 2$

$\boxed{y = 2x + 7}$