$\bar{X} = 20.5$

$m \approx 21.5$

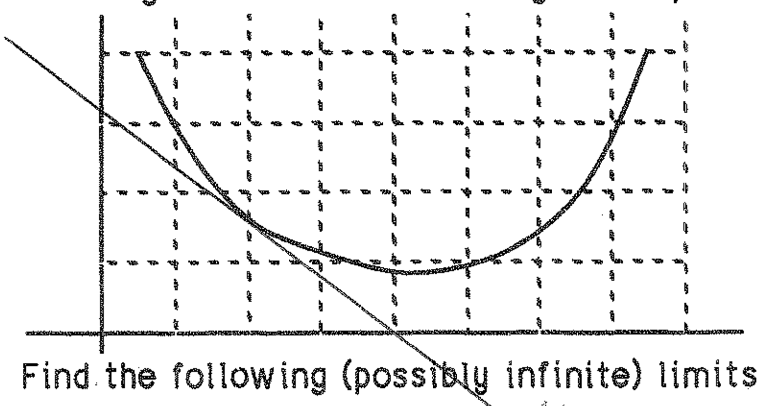
MATH 131
Quiz III
September 15, 1989

Name KEY

4 1. For the function f with the following graph, estimate f'(2) by <u>drawing</u> the tangent line and estimating its slope.

$(2, 1.5)$
$(4, 0)$

$\frac{-1.5}{2} = -\frac{3}{4}$



10 2. Find the following (possibly infinite) limits. If any do not exist, say so

a. $\lim\limits_{x \to \infty} \frac{1 - x^2}{2x^2 - x}$ $\quad \lim\limits_{x \to \infty} \frac{1/x^2 - 1}{2 - \frac{1}{x}} = \frac{-1}{2} = -\frac{1}{2}$

½

b. $\lim\limits_{x \to 1^-} \frac{3}{x - x^2}$ $= \lim\limits_{x \to 1^-} \frac{3}{x(1-x)} = +\infty$

$\frac{+}{+\ +}$

few got

not good choice

$x^2 - x$ better

8 4. Using only the <u>Definition</u>, find f'(3) for $f(x) = \sqrt{x+2}$. [You may find f'(x) instead.]

$$f'(3) = \lim_{x \to 3} \frac{f(x) - f(3)}{x - 3} = \lim_{x \to 3} \frac{\sqrt{x+2} - \sqrt{5}}{x - 3}$$

$$\frac{\sqrt{x+2} - \sqrt{5}}{x-3} \cdot \frac{\sqrt{x+2} + \sqrt{5}}{\sqrt{x+2} + \sqrt{5}} = \frac{x + 2 - 5}{(x-3)(\sqrt{x+2} + \sqrt{5})} = \frac{\cancel{x-3}}{\cancel{(x-3)}(\sqrt{x+2} + \sqrt{5})}$$

$$f'(3) = \lim_{x \to 3} \frac{1}{\sqrt{x+2} + \sqrt{5}} = \frac{1}{\sqrt{5} + \sqrt{5}} = \frac{1}{2\sqrt{5}}$$

8 5. Using only the <u>definition</u> (either form) find f'(x) (or dy/dx) for the function $f(x) = 2x^2 - 1$. [Or f'(2) for partial credit.] several

$$\frac{2(x+\Delta x)^2 - \cancel{1} - (2x^2 - \cancel{1})}{\Delta x} = \frac{2(x^2 + 2x\Delta x + (\Delta x)^2) - 2x^2}{\Delta x}$$

$$= \frac{\cancel{2x^2} + 4x\Delta x + 2(\Delta x)^2 - \cancel{2x^2}}{\Delta x} = \frac{\cancel{\Delta x}(4x + 2\Delta x)}{\cancel{\Delta x}}$$

$$f'(x) = \lim_{\Delta x \to 0} (4x + 2\Delta x) = 4x$$

most could do 5.