First left at 6 min
Median time 10 min
4 still left at 19

MATH 131
Quiz III
September 18, 1992

Name Key

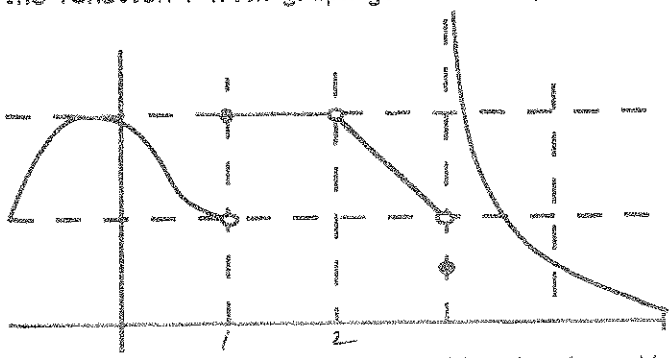
short
easy

4 1. Complete the following definition: The Derivative of the function f is defined by

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

all but 4
(~3 left off limit)

6 2. For the function f with graph given below:



8 missed /28
Some forgot 2

a. For what values of x is the function f not continuous? 1 2 3

b. What value for f(2) would make the function continuous at x = 2, if any? 2

3. Find the following limits (show work):

6 a. $\lim_{x \to -1} \frac{x^3 - 2x^2 - 3x}{(x+1)\,x^2}$

$$\frac{x(x^2-2x-3)}{(x+1)x^2} = \frac{x(x+1)(x-3)}{\cancel{(x+1)}\,x^2}$$

$$= \frac{x(x-3)}{x^2} \longrightarrow \frac{(-1)(-4)}{(-1)^2} = 4$$

all but 6

3 missing
3 major errors

6 b. $\lim_{h \to 0} \frac{\sqrt{h+2} - \sqrt{2}}{h} \cdot \frac{\sqrt{h+2}+\sqrt{2}}{\sqrt{h+2}+\sqrt{2}} = \lim_{h \to 0} \frac{h+2-2}{h(\sqrt{h+2}-\sqrt{2})}$

$$= \lim_{h \to 0} \frac{\cancel{h}\ 1}{\cancel{h}(\sqrt{h+2}-\sqrt{2})} = \frac{1}{\sqrt{2}+\sqrt{2}} = \frac{1}{2\sqrt{2}} = \frac{\sqrt{2}}{4}$$

22 got all

4. Using only the definition, find f'(x) when f(x) = 3x² - x.

8

$$\frac{f(x+h)-f(x)}{h} = \frac{3(x+h)^2-(x+h)-(3x^2-x)}{h}$$

$$= \frac{3(x^2+2xh+h^2)-x-h-3x^2+x}{h}$$

$$= \frac{\cancel{3x^2}+6xh+3h^2-\cancel{x}-h-\cancel{3x^2}+\cancel{x}}{h}$$

$$= \frac{\cancel{h}(6x+3h-1)}{\cancel{h}} \longrightarrow 6x-1$$

as $h \to 0$

all but 5