

# Quiz 1

## Math 252

Name: *Key*

Show *all* your work (algebraically or geometrically) for each and simplify. No credit is given without supporting work.

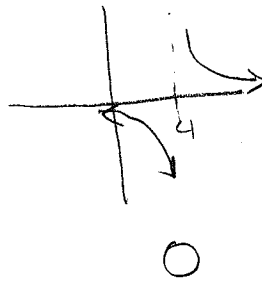
1. [3] Find the following:

$$\lim_{x \rightarrow 0} (\sin x - 3 \cos x)$$

$$\begin{aligned} \lim_{x \rightarrow 0} \sin x - 3 \lim_{x \rightarrow 0} \cos x \\ = -3 \end{aligned}$$

*direct over difference .5*

$$\lim_{x \rightarrow \infty} \frac{1}{x-4}$$



$$\lim_{x \rightarrow 1} \frac{\ln x}{x-1}$$

$$\begin{aligned} &= \lim_{x \rightarrow 1} \frac{\frac{1}{x}}{1} + .5 \\ &= \lim_{x \rightarrow 1} \frac{1}{x} = 1 \end{aligned}$$

2. [3] Find  $\frac{dy}{dx}$  given

$$y = x \sin x$$

$$x \cos x + \sin x$$

*product rule +.5*

$$y = 5x^2 - 3x + 1$$

$$10x - 3$$

$$y = e^{3x}$$

$$3e^{3x}$$

*chain rule +.5*

3. [2] Define or explain in your own words what conditions a function must satisfy to be continuous. Please use examples and be clear.

A function  $f$  is cont if  
for all points in the domain

$$\lim_{x \rightarrow a^+} f(x) = f(a) = \lim_{x \rightarrow a^-} f(x)$$

or  
The graph of  $f$  may be  
drawn without picking  
up your pencil.

4. [2] Define or explain in your own words what the derivative of a function at a point is. Please use examples and be clear.

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

or

$$f'(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

or  
The derivative of a function  
at a point  $a$  is the  
slope of the line tangent  
to the function at  $a$ .

take a derivative  
take a slope  
take a line  
slope