

Math 1A Quiz 2
September 7th, 2007

Name _____ SID _____

1. Answer the following questions True or False. Use T for true and 0 for false.

___ a) $e^{xy} = e^x + e^y$ for all x and y .

___ b) $\sin\left(x + \frac{\pi}{2}\right) = \cos x$ for all x .

___ c) Every polynomial has a real zero.

___ d) There is at least one real number a such that $e^a = \sin a$.

___ e) If f and g are two functions and $\lim_{x \rightarrow a} (f(x) + g(x))$ exists, then $\lim_{x \rightarrow a} f(x)$ exists and $\lim_{x \rightarrow a} g(x)$ exists.

___ f) If f is a function and $|f|$ is continuous, then f is continuous.

___ g)

$$\lim_{x \rightarrow 0} x \sin\left(\frac{1}{x}\right) = 0.$$

___ h) If a function is continuous everywhere, then it is differentiable everywhere.

___ i) If a function f is continuous everywhere, then $\lim_{x \rightarrow a} f(x)$ exists for every real number a .

___ j) If a function is differentiable everywhere, then it is continuous everywhere.

2. Using the limit laws and our rules for trigonometric functions, calculate

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{2 \sin x}.$$

3. Let $f(x) = \frac{1}{x}$. Using the limit definition of the derivative, find $f'(x)$.
What is the slope of the line tangent to the graph of $f(x)$ at $(1, 1)$?

4. Bonus Point: Find a function f whose domain is all real numbers, such that f is not continuous anywhere, but f^2 is differentiable everywhere.