

Math 1271 Quiz 2

February, 6, 2014

Name: SOLUTIONS

TA: _____

NO CALCULATORS. NO HANDHELD DEVICES. NO BOOKS OR REFERENCE MATERIALS OF ANY KIND.

Time allowed: 20 minutes; Grader : Amit Sharma. Good luck!

1. (35 points) Evaluate the following limit

$$\lim_{x \rightarrow 9} \underbrace{\frac{3 - \sqrt{x}}{9x - x^2}}_{f(x)}$$

$$f(x) = \frac{3 - \sqrt{x}}{x(9 - x)} \cdot \frac{3 + \sqrt{x}}{3 + \sqrt{x}} = \frac{9 - x}{x(9 - x)} \cdot \frac{1}{3 + \sqrt{x}}$$

$$= \frac{1}{x} \cdot \frac{1}{3 + \sqrt{x}} \xrightarrow{x \rightarrow 9} \frac{1}{9} \cdot \frac{1}{3 + \sqrt{9}} = \frac{1}{9 \cdot 6} = \frac{1}{54}$$

2. (15 points) State whether the following statement is true or false:

$$0 = \sin(\pi + 0) = \lim_{x \rightarrow \pi} \sin(x + \sin(x)) = \frac{\sqrt{3}}{2} \leftarrow \text{FALSE}$$

3. (15 points) State whether the following statement is true or false:

The following function

$$f(x) = \begin{cases} \sin(x) & \text{if } x < \frac{\pi}{4}; \\ \cos(x) & \text{if } x \geq \frac{\pi}{4}; \end{cases} \leftarrow \text{TRUE}$$

is continuous on $(-\infty, \infty)$.

$$\leftarrow f(\pi/4^-) = f(\pi/4^+) = f(\pi/4) = \sqrt{2}/2$$

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.

4. (35 points) Evaluate the following limit.

$$\lim_{x \rightarrow 0^-} \left(\frac{1}{x} - \frac{1}{|x|} \right).$$

$$\frac{1}{x} - \frac{1}{|x|} \stackrel{x < 0}{=} \frac{1}{x} - \frac{1}{-x}$$

$$= \frac{1}{x} + \frac{1}{x}$$

$$= \frac{2}{x} \xrightarrow{x \rightarrow 0^-} -\infty$$

↑

$$\frac{2}{0^-} = -\infty$$

ANSWER: $-\infty$

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.