

Math 1271 Quiz 5

March, 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) Use logarithmic differentiation to evaluate  $\frac{dy}{dx}$

$$y = (x^2 + 5)^{\sin x}$$

$$\frac{dy}{dx} = [(x^2 + 5)^{\sin x}] \left[ \frac{d}{dx} [(\sin x)(\ln(x^2 + 5))] \right]$$

$$= [(x^2 + 5)^{\sin x}] \left[ (\cos x)(\ln(x^2 + 5)) + (\sin x) \left( \frac{2x}{x^2 + 5} \right) \right]$$

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

$$\frac{0}{5} = \lim_{x \rightarrow 1} \frac{x^2 - 3x + 2}{x^2 + 4x} = \lim_{x \rightarrow 1} \frac{2x - 3}{2x + 4} = \frac{-1}{6}$$

False

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

$$1091x^{1090}e^{-x} - x^{1091}e^{-x} = \frac{d}{dx} \left( \frac{x^{1091}}{e^x} \right) = \frac{(1091 - x)x^{1090}}{e^x} = (1091 - x)x^{1090}e^{-x}$$

True

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.

4. (35 points) Differentiate the following expression using the chain rule, i.e. evaluate  $\frac{dy}{dx}$

$$y = \sqrt{x + \sqrt{x + \sqrt{2}}}.$$

||

$$\left(x + (x + \sqrt{2})^{1/2}\right)^{1/2}$$

$$\frac{dy}{dx} = \frac{1}{2} \left(x + (x + \sqrt{2})^{1/2}\right)^{-1/2} \left[ \left(1 + \frac{1}{2} (x + \sqrt{2})^{-1/2}\right) (1) \right]$$

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.