

Sample

Name and Discussion Section Time: _____

M 408C

Exam 3

Reid Spring 2008

1. Find the most general anti-derivatives for the following functions:

(i) xe^x 10 points

(ii) $\frac{3}{(x^2+4)}$ 10 points

2.(a) On what intervals is the function $f(x) = \frac{e^x}{x}$ increasing/decreasing. Classify any local minima or maxima of f . **12 points**

(b) Prove that the function $f(x) = (1 + x^3)^{\frac{1}{5}}$ is one-to-one on $(0, \infty)$. What is the inverse function of f ? **8 points**

3.(a) Sketch the region A bounded by the curves $y = e^x$, $y = e^{-x}$, $x = -2$ and $x = 1$. **5 points**

(b) What is the area of A . **10 points**

4. Evaluate $\int_e^{e^2} \frac{dx}{x \ln x}$. 10 points

5.(a) Show that $t \ln t - t$ is an anti-derivative for $\ln t$. **6 points**

(b) Use part (a) to evaluate $\int_1^{\sqrt{e}} x \ln x^2 dx$. (**Hint: Substitution**) **9 points**

6. (a) Sketch the region Ω bounded by the curves $x = y^2$, and $x = 2y$ marking carefully the points where these curves meet. **8 points**

(b) Find the volume of the solid obtained by revolving the region Ω (from part (a)) about the **y-axis**. **12 points**