

Name: \_\_\_\_\_

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30 minutes maximum. No aids (book, calculator, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form. 25 points possible.

1. [9 points] For each part below, **completely set up, but do not evaluate**, an integral for the quantity.

a. The length of the curve  $y = \frac{x^2}{8} - \ln x$  on the interval  $1 \leq x \leq 3$ .

b. The area of the surface formed by revolving the graph of  $y = x^4$ , on the interval  $[-1, 1]$ , around the  $x$ -axis.

c. The area between the graphs of  $y = e^{-x^2}$  and  $y = 2x + 7$  on the interval  $[-1, 1]$ .

2. [8 points]

a. Sketch the region between  $y = e^{-x^2}$  and the  $x$ -axis, on the interval  $[1, 2]$ .

b. Find the volume of the solid formed by revolving the region in part **a** around the  $y$ -axis. (Yes, you can do the integral if you use the right volume technique.)

3. [8 points] Find the area of the surface of revolution from rotating  $y = x^2$  from  $x = 0$  to  $x = 1$  around the  $y$ -axis. (Yes, you can do the integral.)

**EC. [1 points] (Extra Credit)** Though I do not know how to find antiderivatives for the integrals in **1b** and **1c**, the integral in **1a** can be computed by hand. Do so.

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