MATH 141, FALL 2009, MIDTERM 1 - REVIEW

1) Let $f(x) = 2^x$, and let R be the region between the graph of f and the x axis on $[0, 1]$. Find the volume V of the solid obtained by revolving R about the x axis. [NO PARTIAL CREDIT]

2) Find the area of a surface obtained by rotating the curve given parametrically by

$$x = f(t) = \cos^2(t)$$

and

$$y = g(t) = \sin^2(t),$$

for $0 \le t \le \pi/2$, about x axis.

3) Evaluate the integral:

$$\int \frac{1}{x(1 + \ln^2(x))} \, dx$$

4) Find the center of gravity of the region R between the graphs of f and g, where $f(x) = 2 - x^2$, and $g(x) = |x|$.

5) Find the value of the following limit, if it exists:

$$\lim_{x \to \infty} \frac{e^x}{x^3}.$$

If the limit does not exist, explain why.