Warm-up Problems - January 30, 2006

1. Compute the following integrals

   (a) $\int \frac{\ln x}{x}\, dx$

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

2. Find the number $a > 0$ so that $f(x)$ below is a probability density function:

$$f(x) = \begin{cases} x^2 & \text{if } 0 \leq x \leq a \\ 0 & \text{otherwise} \end{cases}$$

Lecture Problems

3. Graph the following in $\mathbb{R}^3$:

   (a) $x = 1$

   (b) $x^2 + y^2 = 1$

   (c) $y = e^x$

4. Let $z = f(x, y) = x + y^2$. Describe the cross sections and graph.

   (a) $x = 0$

   (b) $x = 1$

   (c) $x = -1$

   (d) $y = 0$

   (e) $y = 1$