Math 107 Exam 2 April 5, 2001 Professor Spruck

1a.(10pts) Find the length of the curve $y = \cosh x = \frac{e^x + e^{-x}}{2}$ from $x = 0$ to $x = 1$. Hint: Recall $y' = \sinh x = \frac{e^x - e^{-x}}{2}$ and $1 + \sinh^2 x = \cosh^2 x$.

b.(10pts) Find the surface area of the surface of revolution obtained by revolving $y = \cosh x$ about the x axis from $x = 0$ to $x = 1$.

2. Let $p(x) = cx^{-3}$ on $[1, \infty)$.
a.(10pts) Choose c so that $p(x)$ is a probability disribution.
b.(10pts) Find the mean of the distribution.
c.(10pts)Find the median of the distribution.

3.(15pts)Evaluate the improper integral using the definition:

$$\int_1^\infty \frac{\ln x}{x^2}\, dx$$

4a.(7pts) State Simpson's rule for approximating $\int_a^b f(x)\, dx$ with n partitions of equal size.
b.(8pts)Use Simpson's rule with $n = 6$ to approximate $\int_0^\pi \sin x\, dx$.

5.(10pts) Suppose that troubled S&L's are failing at the rate of 5% per year. What is the probability that a randomly selected S&L will last more than 40 years?

6.(10pts) The mean lifespan of a certain brand of tire is 30,000 miles with a standard deviation of 2000 miles, and is normally distributed. How many miles must a tire last to fall into the top 10% of lifespan?

Z	Area from 0 to Z
1.25	0.3944
1.26	0.3962
1.27	0.3980
1.28	0.3997
1.29	0.4015
1.30	0.4032