Math 222, Section 5
Exam II
3/19/14

Name: ________________________________________________

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**NOTE:** I need to see all of your work for each problem. Unjustified work will receive little or no credit.
1. (20 points) Set up, but do not evaluate, the integral (or integrals) to determine each of the following:

(a) The length of the curve $y = e^{x^2}$ from $x = 0$ to $x = 1$.

(b) The surface area formed by rotating the graph of $y = e^{x^2}$ (from $x = 0$ to $x = 1$) around the $x$-axis.

(c) The $x$ and $y$ coordinates of the center of mass of the region bounded by $y = e^{x^2}$ and $y = 0$ between $x = 0$ and $x = 1$. 
2. (20 points) Evaluate the integral

$$\int_{-\infty}^{0} xe^{x} \, dx.$$
3. (20 points) Determine whether each of the following series converges or diverges. If it converges, determine the value of the series.

(a) \[\sum_{n=1}^{\infty} 7\left(\frac{3}{4}\right)^{n-1} - 6\left(-\frac{2}{3}\right)^{n-1}\]

(b) \[\sum_{n=1}^{\infty} \frac{2}{n}\]

(c) \[\sum_{n=1}^{\infty} \frac{1}{n^{1/2}}\]

(d) \[\sum_{n=1}^{\infty} \frac{n^5 + 2n^2 - 7}{4n^5 + 3n^4 - 6n^2}\]
4. (20 points) Use the integral test to determine if each of the following sums converge.

(a) \( \sum_{n=1}^{\infty} \frac{n^2}{n^3+1} \).

(b) \( \sum_{n=1}^{\infty} \frac{n}{n^4+1} \).
5. (20 points) Use a comparison test to determine if each of the following series converges.

(a) $\sum_{n=1}^{\infty} \frac{5}{n^2 + 2n + 6}$.

(b) $\sum_{n=1}^{\infty} \frac{\sqrt{n^4 + n^2 + 6n + 2}}{\sqrt{4n^4 + 2n + 8}}$. 