Name ____________________________
Student ID # ____________________________
Class Section ____________________________
Instructor ____________________________

Math 1100
Fall 2006

EXAM I

<table>
<thead>
<tr>
<th>Problem</th>
<th>Points</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20</td>
<td></td>
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<td>2.</td>
<td>20</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Show all your work and make sure you justify all your answers.
Math 1100
practice Exam

1. Find $\frac{dy}{dx}$ for three of the four problems below. (If you do not clearly indicate which two you want graded I reserve the right to give you a zero score.)

   (a) $y = e^{x^7} + x \ln(x^2)$

   (b) $y = \ln(\ln(x^3 + 1)) + e^{x^{2+1}}.$

   (c) $y - \ln(xy) + (x^2 + 1)^3 e^{y^{2+1}} - x + 10 = 0$

   (d) $\ln(x^2 y + x) + (y^2 + 1)^3 e^{x^{2+1}} - 10x + 10 = 0$
2. Integrate three of the four problems below. (If you do not clearly indicate which two you want graded I reserve the right to give you a zero score.)

(a) \( \int (x^3 + 1)e^{x^4 + 4x + 4} \, dx \)

(b) \( \int x(x - 1)^{\frac{3}{2}} \, dx \)

(c) \( \int \frac{x^2}{(x^3 + 4)^{\mu}(x^3 + 4)} \, dx \)

(d) \( \int \frac{1}{1 + e^{-x}} \, dx \)
3. Find the definite integral for two of the three problems below. (If you do not clearly indicate which two you want graded I reserve the right to give you a zero score.)

(a) $\int_{1}^{5} \frac{x^2}{x^2+4} \, dx$

(b) $\int_{0}^{5} |x - 2| \, dx$

(b) $\int_{-5}^{5} e^x - e^{-x} \, dx$ (Hint show this is an odd function. What do you know about an odd function on a symmetric interval?) Justify your answer.
4. Answer one of the two problems below. (If you do not clearly indicate which two you want graded I reserve the right to give you a zero score.)

(a) Find consumer and producer surplus given demand function \( D(x) = -x^2 + 10 \) and supply function \( S(x) = .1x + 2 \).

(b) Find the area bounded by the curves \( f(x) = 3x^3 - x^2 - 10x \) and \( g(x) = -x^2 + 2x \).
5. Given that your marginal cost is $50 - .8x$ and marginal revenue is $10x + 50$ find your profit function given that when you produce no units you make no profit. Find how much profit you make when you produce ten units by expressing this as a definite integral (what does the definite integral represent?).