December 3, 2010 **MATH 104 (John Orr's Section)** **EXAM IV**

NAME:_____

This exam should have 4 pages; please check that it does.

Question:	1	2	3	4	5	6	7	8	Total
Points:	20	10	20	10	10	10	10	10	100
Score:									

1. Find the following **indefinite integrals**:

   (a) (7 points) $\int (x^4 + 4x^{1/3} + x^{-3})\, dx$

   (b) (6 points) $\int \dfrac{2x^3 + x}{x}\, dx$

   (c) (7 points) $\int \left(\dfrac{1}{x} + 4e^{3x}\right) dx$

2. (10 points) Given that the **marginal cost** function is $C'(x) = 12x^2 + 20$ and $C(0) = 250$, find the **total cost** for producing 20 units.

3. Evaluate the following **definite integrals**:

   (a) (10 points) $\int_1^3 \left(2x + \frac{1}{x^2}\right) dx$

   (b) (10 points) $\int_0^4 \sqrt{x}\, dx$

4. (10 points) Use **substitution** to find the indefinite integral $\int \frac{x}{(x^2+4)^3}\, dx$

5. (10 points) Sketch the region whose area is represented by the definite integral $\int_1^4 (x^2+1)\, dx$

6. (10 points) Suppose $10,000$ is deposited in a savings account at an annual interest rate of 4.5% compounded continuously. Write down a formula for the **average balance** of the account over the first five years. You do **not** need to evaluate this.

7. Let R be the region enclosed by the parabola $y = 4 - x^2$ and the straight line $y = 2 - x$.

   (a) (5 points) Sketch a graph of the region R. (First find the two points where the curves intersect.)

   (b) (5 points) Write down a **definite integral** to give the area of R. You do **not** need to evaluate the integral.

8. (10 points) Suppose that in a certain market the **demand function** is $p = 340 - 4x$, and the **supply function** is $p = 40 + 2x$. Calculate the **consumer surplus**.