

Name: \_\_\_\_\_

**Math 1311**  
**Test 3**  
**Fall 2003**

1. Find the indefinite integrals.

(a)  $\int \frac{7}{(2x+3)^3} dx$

(b)  $\int \frac{x^5 - 2x + 5}{x^3} dx$

2. Evaluate the integrals.

(a)  $\int_0^{\frac{\pi}{4}} \frac{\sin t}{\sqrt{\cos t}} dt$

(b)  $\int_0^2 x^2 \sqrt{9 - x^3} dx$

3. Find the area of the plane region bounded by the curves  $y = x^4$  and  $y = 2x^2 - 1$ .

4. Calculate the trapezoidal approximation and Simpson's approximation to

$$\int_0^{\pi} \sqrt{1 - \cos x} dx$$

with six subintervals.

5. Use the definition of the integral as a limit of a Riemann sum to evaluate the integral

$$\int_0^1 (2x^2 - 1)dx$$

6. (optional) Bonus 10 points

Find a function  $f$  such that

$$x^2 = 1 + \int_1^x \sqrt{1 + [f(t)]^2} dt$$

(Hint: Differentiate both sides)