

**EXAM 3**  
Math 106  
October 12, 2006

Name \_\_\_\_\_

You must show all your work. Partial credit will be given. Each problem is worth 6 points.

1. Find the general antiderivative for each of the functions.

(a)  $s(t) = t^3 - 3t^2 + 3t - 1.$

(b)  $f(x) = 4x^{-2} + 2t^{-1} + 1.$

(c)  $g(t) = 2^t.$

(d)  $y = \frac{4x^3 - 15}{x^2}.$

2. Find all the inflection points for  $displaystyle g(x) = \frac{3}{x^2+1}$ .

3. Use the second derivative test to determine all relative maximums and relative minimums for  $f(x) = -x^4 - 2x^3 + 12x^2$ .

4. Find each of the following

(a)  $\int [5(2^t) - 3t^2] dt$

(b)  $\int \frac{25u - 1}{u} du$

(c)  $\int (2x - 9)e^{x^2 - 9x + 21} dx$

(d)  $\int \frac{2t}{4t^2 - 5} dt$

(e)  $\int_{-1}^1 3x + 4 \, dx$

(f)  $\int_1^3 (-x^2 + 4x - 3) \, dt$

5. Based on 1.5 minutes of data the velocity of a certain minivan may be modeled by

$$V(t) = -2.133t^3 + 3.999t^2 - 0.1533t + 0.3167$$

miles per minute, where  $t$  is the number of minutes since measurement began. Find a position function  $D(t)$  which describes the distance traveled by the minivan since measurement began.

6. Use a left hand sum with  $n = 10$  to estimate the area between the graph of  $y = x^2 - 2^x$  and the  $x$  axis on the interval  $[2, 4]$ .

7. Use a right hand sum with  $n = 5$  to estimate the area between the graph of  $s(t) = \ln(t)$  and the horizontal axis on the interval  $[1, e]$ .

8. Find the exact area between the graph of  $y = e^x - x^2$  and the  $x$ -axis from  $x = 0$  to  $x = 2$ .