Math 112-3
Test 1
Friday, January 16, 1998

Name:____

SSN:____

SHOW ALL WORK ! UNSUPPORTED ANSWERS WILL RECEIVE LESS THAN HALF CREDIT.

1. (12pts) Compute the following indefinite integrals:

a. $\displaystyle\int \frac{x^3 - 3x}{\sqrt{x}} dx$

b. $\displaystyle\int (2 + 3t^2)^2 dt$

c. $\displaystyle\int 12x^2 \cos(4x^3) dx$

2. (10pts) When the brakes are fully applied, a certain car undergoes a constant deceleration of 22 feet per second per second. If its initial velocity is 90 miles per hour, then how long will it take to come to a stop? How many feet will the car travel in that time? (Reminder: There are 5280 feet in 1 mile.)

3. (10pts) Recall that we proved in class that

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2} \quad \text{and} \quad \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$$

Use these formulas to compute $\sum_{i=1}^{50}(3i-2)^2$.

4. (12pts) Consider the region under the curve $y = x^2 + 1$ as x runs from 0 to 1.

a. Sketch this region and estimate its area using *inscribed rectangles* and 5 subintervals.

b. Estimate the area using *circumscribed rectangles* and 5 subintervals.

c. Compute the area exactly. (Feel free to use the Fundamental Theorem of Calculus, rather than taking the limit as the number of subrectangles goes to ∞.)

5. (12pts) Compute the following definite integrals.

a. $\int_0^3 x^2\sqrt{x^3+9}dx$

b. $\int_0^{\pi/4} \frac{\sin t}{\sqrt{\cos t}}dt$

c. $\int_{-1}^1 x\sin(x^2)dx$

6. (12pts) a. Compute $h'(x)$ if $h(x) = \int_0^{x^2} t^3 \sin t^4 dt$.

b. Find the average value of $f(x) = x^3 - 2x + 1$ as x varies from 1 to 3.