EXAM 2
Math 115
Nov. 16, 2000

Name _____

1. Find each of the following. (6 pts each)

(a) $\int 56t^{\frac{5}{2}} + 18t^{\frac{7}{2}}\, dt.$

(b) $\int \left(\frac{3}{x} + 4e^{-.5x}\right)\, dx.$

(c) $\int x\sqrt{z^2 - 5}\, dz.$

(d) $\int \frac{(1 + \ln x)^2}{x}\, dx.$

(e) $\int_0^2 (5x^2 - 4x + 2)\, dx.$

(f) $\int_0^8 x^{\frac{1}{3}} \sqrt{x^{\frac{4}{3}} + 9}\, dx.$

2. Find the area between the curves $y = x^2 - 18$ and $y = x - 6$. (8 pts)

3. Use four rectangles to approximate the area under the curve $f(x) = x^2 + 1$ from $x = 1$ to $x = 4$. (8 pts)

4. Find $\frac{dy}{dx}$ for each of the following equations. (6 pts each)

   (a) $x^3 - 6y^2 = 10$.

   (b) $y^3 + xy - y = 8x^4$.

5. Find the absolute maximum and the absolute minimum (if they exist) for the function $f(x) = (x+1)(x+2)^2$ on the interval $[-4, 0]$. (8 pts)

6. Under certain conditions, the number of cancer cells $N(t)$ at time t increases at a rate

$$N'(t) = Ae^{0.2t},$$

where A is the rate of increease at time 0 (in cells per day).

(a) Suppose $A = 50$, and at 5 days the cells are growing at a rate of 250 per day. Find a formula for the number of cells after t days, given that 300 cells are present at $t = 0$. (6 pts)

(b) Use part a) to find the number of cells present after 12 days. (4 pts)

7. A closed box with a square base is to have a volume of 16,000 cm^3. The material fo the top and bottom of the box costs \$3 per square centimeter, while the material for the sides costs \$1.50 per square centimeter. Find the dimensions of the box which lead to minimum total cost. (7 pts)

8. Under certain conditions, a person can memorize W words in t minutes, where

$$W(t) = \frac{-.02t^2 + t}{t+1}.$$

Find $= \dfrac{dW}{dt}$ when $t = 5$. (7 pts)