Math 141,   Exam 3,   2000

PRINT Your Name:_____ Recitation Time _____ Tu. Th.
There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your
work. $\boxed{CIRCLE}$ your answer. **NO CALCULATORS!**

1. Let $3x^2y^4 = \cos(4x^2y^5)$. Find $\frac{dy}{dx}$.

2. Let $y = 3x^2\sin^2(x^3)$. Find $\frac{dy}{dx}$.

3. Let $f(x) = 3x - x^3$. Find all vertical and horizontal asymptotes of $y = f(x)$.
   Where is $f(x)$ increasing, decreasing, concave up, and concave down? Find
   all local maximum points, local minimum points, and points of inflection of
   $y = f(x)$. Graph $y = f(x)$.

4. Find $\int x(x+1)dx$.

5. Let $f(x) = \frac{x}{x^2-4}$. Find all vertical and horizontal asymptotes of $y = f(x)$.
   Where is $f(x)$ increasing, decreasing, concave up, and concave down? Find
   all local maximum points, local minimum points, and points of inflection of
   $y = f(x)$. Graph $y = f(x)$.

6. State the Mean Value Theorem.

7. Each side of a square is growing at the rate of 4 inches per second? How fast
   is the area of the square growing, when the length of each side is 10 inches?

8. The height of an object above the ground at time t is $s(t) = -16t^2 + 32t + 48$,
   where s is measured in feet and t is measured in seconds. What is the velocity
   of the object when it strikes the ground?

9. A page of a book is to contain 27 square inches of print. If the margins at the
   top, bottom, and one side are 2 inches and the margin at the other side is 1
   inch, what size page would use the least paper?

10. A farmer wishes to fence off three identical adjoining rectangular pens, each
    with 300 square feet of area. What should the width and length of each pen be
    so that the least amount of fence is required?