Math 142,  Exam 2,  Fall 2002

Name _____________________________

There are 10 problems on 6 pages. Each problem is worth 10 points each. SHOW your work. [CIRCLE] your answer. NO CALCULATORS! CHECK your answer whenever possible.

1. Find \( \int \sin^5 x \, dx \). Check your answer.

2. Find \( \int \cos^4 x \, dx \).

3. Find \( \int \sin 4x \cos 5x \, dx \).

4. Find \( \int \sec^3 x \, dx \). Check your answer.

5. Find \( \int x \cos x \, dx \). Check your answer.

6. Find \( \int \frac{\sqrt{1-x^2}}{x} \, dx \).

7. If \( y = \arcsin(2x^2) \), then find \( \frac{dy}{dx} \).

8. Simplify \( \cos[2 \arcsin(\frac{1}{3})] \).

9. Find the solution of the differential equation \( \frac{dy}{dx} - \frac{y}{x} = 3x^3 \) which satisfies \( y(1) = 0 \). Check your answer.

10. Let \( f(x) = x \ln x \). What is the domain of \( f(x) \)? Where is \( f(x) \) increasing, decreasing, concave up, and concave down? Find the local maxima, local minima, and points of inflection of \( y = f(x) \). Graph \( y = f(x) \).