**Math 142, Exam 2, Fall 2002**

Name _____

There are 10 problems on 6 pages. Each problem is worth 10 points. each. SHOW your work. $\boxed{CIRCLE}$ 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 $\int \dfrac{\sqrt{1-x^2}}{x}\, dx$ .

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 $y = f(x)$ .