Name: _____

Calculus 2

MA126-8B

Midterm Examination 1

Tuesday, September 30, 2003

Instruction: Answer the questions in the space provided. Use the scratch paper provided if needed. Please keep your answers neat, brief, and to the point. Show all the steps in your derivations.

Question 1	_____
Question 2	_____
Question 3	_____
Question 4	_____
Question 5	_____
Question 6	_____
Total	_____

Please do not write in this box

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QUESTION 1. Define:

$$f(x) = \int_0^x \sin(t^2)\, dt, \qquad -\sqrt{\pi} < x < \sqrt{\pi}.$$

Determine the interval(s) where f is decreasing.

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QUESTION 2. Find the integral:

$$\int \frac{dx}{\sqrt{x^2-4}}.$$

Hint: Substitute $x = 2\cosh u$.

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QUESTION 3. Find the integral:

$$\int (\ln x)^2 \, dx.$$

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QUESTION 4. Compute:

$$\int_0^1 \frac{x^3\,dx}{x^2+1}.$$

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QUESTION 5. The trapezoid method T_n is used to approximate the following integral:

$$\int_0^1 \cos\left(x^3\right)\, dx.$$

How large should one choose n in order to guarantee the error is less than 10^{-6}?
Hint: Recall that the error in the trapezoid method can be estimated by:

$$|E_M| \leq \frac{K(b-a)^3}{12n^2}.$$

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QUESTION 6. Determine whether the following improper integral converges:

$$\int_0^1 \frac{\sqrt{x^2+1}}{x}\,dx.$$