Name: _____

Calculus 2

MA126-6B

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, complete but brief, and to the point.

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:

$$f(x) = \int_0^x \cos(t^2)\, dt, \qquad 0 < x < \sqrt{\pi}.$$

Determine the interval(s) where f is increasing.

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QUESTION 2. Find the integral:

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

Show all the steps in your derivation.
Hint: Substitute $x = 2\sinh u$.

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QUESTION 3. Compute:

$$\int_0^1 \frac{dx}{x^2 - 4}.$$

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QUESTION 4. Find the integral:

$$\int \cos^3 x \, \sin^2 x \, dx.$$

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QUESTION 5. The midpoint method M_n is used to approximate the following integral:

$$\int_0^1 e^{x^3}\, dx.$$

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

$$|E_M| \leq \frac{K(b-a)^3}{24n^2}.$$

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QUESTION 6. Determine whether the following improper integral converges:

$$\int_1^\infty \frac{1}{\sqrt{x^3+1}}\,dx.$$