Name:_____
SID:_____
Section:_____

Midterm Exam #2-Math 022-F '07
Instructor: Devin Greene

The exam is 50 minutes long. No calculators or notes are permitted. Show your work. You do not need to simplify your answers.

Trigonometric Identities

$$\sin^2 x + \cos^2 x = 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\sin(2A) = 2 \sin A \cos B$$

$$\cos(2A) = \cos^2 A - \sin^2 A$$

$$\cos^2 A = \frac{1}{2}(1 + \cos 2A)$$

$$\sin^2 A = \frac{1}{2}(1 - \cos 2A)$$

$$\sin A \sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$$

$$\cos A \cos B = \frac{1}{2}[\cos(A-B) + \cos(A+B)]$$

$$\sin A \cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$$

$$\int \sin^n x dx = -\frac{1}{n}\cos x \sin^{n-1} x + \frac{n-1}{n}\int \sin^{n-2} x dx$$

$$\int \cos^n x dx = \frac{1}{n}\sin x \cos^{n-1} x + \frac{n-1}{n}\int \cos^{n-2} x dx$$

For problems #1-#2, evaluate the integral.

Problem #1

$$\int_1^e t \ln t dt$$

Problem #2

$$\int_{1}^{3/2} \frac{dx}{\sqrt{2x - x^2}}$$

Problem #3

Find the partial fractions decomposition of the following rational function. You do not need to integrate.

$$\frac{x-3}{x^2-4x+4}$$

Problem #4

Does the following integral converge or diverge? If it converges, find its value.

$$\int_{e}^{\infty} \frac{1}{x(\ln x)^3} dx$$