

Name \_\_\_\_\_ Instructor \_\_\_\_\_

**MATH 104 - MIDTERM EXAM**  
Thursday October 24, 2002, 7:00PM-8:30PM  
McCosh 50

Note: This midterm was considered a little too easy. The average was about 70 percent, not a problem, but there was no question hard enough to distinguish well between A and A- students.

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1. (10 points) Find  $\int \frac{e^{\sin x}}{\tan x \csc x} dx$ .
2. (12 points) Find  $\int \frac{dx}{\sqrt[3]{x+1} - 1}$ .
3. (12 points) Find  $\int_1^e x(\ln x)^2 dx$ .
4. (12 points) Find  $\int x^3(x^2 - 4)^{3/2} dx$ . (Assume that  $x > 0$ .)
5. (10 points) Find  $\int \frac{dx}{4x^3 + 4x^2 + x}$ .
6. (12 points) Find  $\int \frac{dx}{x + 4\sqrt{x} + 13}$ .
7. (10 points) The region enclosed by the curves  $y = x^2$  and  $y = x^3$  is revolved around the line  $x = 5$ . Find the volume of the resulting solid.
8. (10 points) The base of a solid is the region below the curve  $y = \sqrt{\arctan x}$  and above the  $x$ -axis, for  $0 \leq x \leq 1$ . (See diagram.) The cross-section through each plane perpendicular to the  $x$ -axis is a square lying above the base. Find the volume.
9. (12 points) Sketch the curve given in polar coordinates by

$$r = 3\theta, \quad \text{for } 0 \leq \theta \leq \pi,$$

and find the length of this curve.