

## Math 1AA Midterm I February 2006, PRACTICE PROBLEMS

The test covers the following sections of the textbook: 6.2, 6.5, 7.1, 7.2, 7.3, 7.4, 7.5, 7.8.

**You will be given a table with the following integrals:**

1)  $\sin(2x) = 2 \sin(x) \cos(x)$

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

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

4)  $\int \sec(x) dx = \ln |\sec(x) + \tan(x)| + C$

5)  $\int \sec^3(x) dx = \frac{1}{2} \sec(x) \tan(x) + \frac{1}{2} \ln |\sec(x) + \tan(x)| + C$

6)  $\int \frac{1}{1+x^2} dx = \arctan(x) + C$

**There will be 5 multiple choice problems on the test.** For example:

Indicate the integral that you would use to find the volume of the solid formed by rotating the region bounded by the graph of  $y = \ln(x)$  around the  $x$ -axis from  $x = 1$  to  $x = 4$ .

a)  $\int_1^4 \pi \ln(x) dx$

b)  $\int_0^1 \pi (\ln(x))^2 dx$

c)  $\int_1^4 \pi (\ln(x^2)) dx$

d)  $\int_0^{\ln(4)} \pi (e^y)^2 dy$

e)  $\int_0^{\ln(4)} \pi e^y dy$

**There will be 4 problems involving integrals.** On these questions, you must show all your work to receive full credit. You may use integrals from the integral table, but you should refer to them by number. For example:

1) Calculate the following integrals or explain why the integral does not exist.

a)  $\int \cos^3(x) dx$

b)  $\int \frac{1}{x^2 - 4x + 5} dx$

2) Calculate the volume of the solid formed by rotating the area enclosed by the graph of  $y = xe^x$  and the line  $x = 1$  around the  $x$ -axis.