Midterm Exam

(Math 200 B, Fall 06)

Solve the following problems. Show all your work in the space under each problem.

1. Answer the following: (15 pts)

(a) Evaluate the integral: $\int_1^2 (1+\frac{1}{x})\,dx$

(b) The result you found in (a) describes:

A. The <u>length</u> of the arc of the hyperbola $y = 1+\frac{1}{x}$ from $x = 1$ to $x = 2$.

B. The <u>area</u> under the hyperbola $y = 1+\frac{1}{x}$ from $x = 1$ to $x = 2$.

C. The <u>volume</u> by revolution around the x-axis generated by the hyperbola $y = 1+\frac{1}{x}$ from $x = 1$ to $x = 2$.

(c) <u>True</u> or <u>False</u>: $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

2. Answer the following: (20 pts)

(a) Evaluate the integral: $\int \frac{3(x+1)}{\sqrt{(3/2)x^2+3x}}\,dx$ (use substitution method)

(b) Evaluate the integral: $\int x\sin x\,dx$ (use by parts method)

3. (a) The area of the region enclosed by the parabolas $y = 2x - x^2$ and $y = x^2$ is: (20 pts)

A. 10/6 B. 2/3 C. 1/3 D. 5/6

(b) The volume of the solid obtained by rotating the region bounded by the curves

$y = \sqrt{x}$ and $y = x^2$ around the x-axis is:

A. 3/10 B. 3π/10 C. 3π/5 D. 10π/3

4. (a) Evaluate the integral: $\int \sin^2 x \cos^3 x \, dx$ (15 pts)

(b) The correct substitution to evaluate the integral $\int \frac{dx}{x^2\sqrt{x^2-4}}$ is:

A. $x = 2\sin\theta$ B. $x = 2\tan\theta$ C. $x = 2\cos\theta$ D. $x = 2\sec\theta$

(c) The correct partial fraction expansion to evaluate the integral $\int \frac{x-1}{(x+1)(x^2+4)^2} dx$ is:

A. $\frac{A}{x+1} + \frac{B}{(x^2+4)^2}$

B. $\frac{A}{x+1} + \frac{Bx+C}{(x^2+4)^2}$

C. $\frac{A}{x+1} + \frac{Bx}{x^2+4}$

D. $\frac{A}{x+1} + \frac{Bx+C}{x^2+4} + \frac{Dx+E}{(x^2+4)^2}$

5. Evaluate the improper integral: $\int_{-\infty}^{0} xe^x dx$ (10 pts)

6. The length of the arc of the curve $x = 2y^{3/2}$ from (0,0) to (2,1). (10 pts)

7. Given the curve $x = \cos^3\theta,\ y = \sin^3\theta$, with $0 < \theta < \pi/2$, find $\frac{d^2y}{dx^2}\Big|_{((\sqrt{2}/2)^3,(\sqrt{2}/2)^3)}$.
(10 pts)