

**Midterm Exam**  
(Math 200 A, 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:  $\int_1^2 \left(1 + \frac{1}{x}\right) dx$

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

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

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

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

(c) True or False:  $\int_a^a f(x) dx = 0$

2. Answer the following: (20 pts)

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

(b) Evaluate the integral:  $\int x \cos x dx$  (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.  $3\pi/10$

C.  $3\pi/5$

D.  $10\pi/3$

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  $\int \frac{10}{(x-1)(x^2+9)} \, dx$  is:

A.  $\frac{A}{x-1} + \frac{B}{x^2+9}$

B.  $\frac{A}{x-1} + \frac{Bx+C}{x^2+9}$

C.  $\frac{A}{x-1} + \frac{Bx}{x^2+9}$

D.  $\frac{A}{x-1} + \frac{B}{(x^2+9)^2}$

5. Evaluate the improper integral:  $\int_{-\infty}^0 x e^x \, dx$  (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  $x = t - t^2$ ,  $y = t - t^3$ , with  $-1 < t < 1$ , find  $\frac{d^2 y}{dx^2} \Big|_{(0,0)}$ . (10 pts)