

Math 104 Fall 2008  
Midterm Exam 1

Name: \_\_\_\_\_

Professor: \_\_\_\_\_

TA: \_\_\_\_\_ Section: \_\_\_\_\_

Write all answers (A, B, C, D, E, F) in the spaces provided below!

1. \_\_\_\_\_

6. \_\_\_\_\_

2. \_\_\_\_\_

7. \_\_\_\_\_

3. \_\_\_\_\_

8. \_\_\_\_\_

4. \_\_\_\_\_

9. \_\_\_\_\_

5. \_\_\_\_\_

10. \_\_\_\_\_

2. No calculators are permitted.
3. One piece of paper (8.5 in. by 11 in.) is permitted, with writing on both sides allowed.
4. There is no penalty for guessing although we may not give credit if no work is shown.
5. No partial credit will be given.

1. What is the (positive) area of the bounded region enclosed by the curves  $y = x^3$  and  $x = y^3$  ?

A.) 2

B.)  $\frac{4}{3}$

C.) 1

D.)  $\frac{3}{4}$

E.)  $\frac{1}{2}$

F.)  $\frac{1}{4}$

**2.** What is the (positive) area of the bounded region enclosed by the curves  $y = 4 \ln(x)$  and  $y = 2x \ln(x)$  ?

A.)  $2 \ln(2)$

B.)  $\frac{5}{2}$

C.)  $\frac{1}{2}$

D.)  $4 \ln(2)$

E.)  $2 \ln(2) - \frac{1}{2}$

F.)  $4 \ln(2) - \frac{5}{2}$

**3.** The region enclosed by the circle

$$x^2 + y^2 = 10$$

and the straight lines  $y = 0$ ,  $x = 1$  and  $x = 3$  is rotated about the  $x$ -axis. Find the volume of the resulting solid of revolution.

A.)  $\frac{32}{3}\pi$

B.)  $\frac{34}{3}\pi$

C.)  $12\pi$

D.)  $\frac{38}{3}\pi$

E.)  $\frac{40}{3}\pi$

F.)  $14\pi$

4. The region enclosed by the hyperbola

$$y = \frac{1}{x}$$

and the straight lines  $x = 0$ ,  $y = 1$ , and  $y = 2$  is rotated about the axis  $x = -1$ . Find the volume of the resulting solid of revolution.

A.)  $(\frac{1}{2} + 2 \ln 2)\pi$

B.)  $(2 + \frac{1}{2} \ln 2)\pi$

C.)  $(\frac{1}{3} + 3 \ln 2)\pi$

D.)  $(3 + \frac{1}{3} \ln 2)\pi$

E.)  $(\frac{1}{4} + 4 \ln 2)\pi$

F.)  $(4 + \frac{1}{4} \ln 2)\pi$

5. The area under the curve  $y = \cos(x)$  from  $x = 0$  to  $x = \pi/2$  is rotated about the  $x$ -axis. What is the volume?

A.)  $\frac{1}{2}\pi^2$

B.)  $\frac{1}{4}\pi^2$

C.)  $\frac{2}{3}\pi^2$

D.)  $\frac{1}{2}\pi^2 - 1$

E.)  $\frac{1}{2}(\pi^2 - 1)$

F.)  $2\pi^2 - 2$

**6.** What is the average of the function  $f(x) = xe^{-3x}$  on the interval  $[-\frac{1}{3}, 0]$  ?

A.)  $-\frac{1}{27}$

B.) 0

C.)  $-1$

D.)  $\frac{1}{14}$

E.)  $\frac{1}{3}$

F.)  $-\frac{1}{9}$

7. What is  $\int_0^{\frac{\pi}{5}} e^x \cos(5x) dx$  ?

A.)  $(e^{\frac{\pi}{5}} + 1)$

B.)  $-\frac{1}{5} (e^{\frac{\pi}{5}} - 1)$

C.) 0

D.)  $-\frac{1}{26} (e^{\frac{\pi}{5}} + 1)$

E.)  $e^{\frac{\pi}{5}}$

F.)  $\frac{1}{26} (e^{\frac{\pi}{5}} - 5)$



8. The region enclosed by the parabola

$$y = 2 + x - x^2$$

and the straight line  $x + y = 2$  is rotated about the  $y$ -axis. Find the volume of the resulting solid of revolution.

- A.)  $\frac{8}{3}\pi$
- B.)  $3\pi$
- C.)  $\frac{10}{3}\pi$
- D.)  $\frac{2}{3}\pi$
- E.)  $\frac{3}{4}\pi$
- F.)  $\frac{5}{6}\pi$

9. The region enclosed by the two curves

$$x = y^2, \text{ and } y = x^2$$

is rotated about the axis  $x = 2$ . Find the volume of the resulting solid of revolution.

A.)  $\frac{14}{15}\pi$

B.)  $\frac{29}{30}\pi$

C.)  $\pi$

D.)  $\frac{31}{30}\pi$

E.)  $\frac{16}{15}\pi$

F.)  $\frac{11}{10}\pi$

10.

$$\int_0^{\sqrt[3]{\pi/4}} 6x^2 \sec^4(x^3) \tan(x^3) dx$$

A.)  $7/6$

B.)  $5/6$

C.)  $11/6$

D.)  $7/12$

E.)  $\pi$

F.)  $2$