

No calculators are allowed on this test. Leave answers in radical form and in terms of  $\pi$ .  
Go through and set up all the free response problems. Then, and only then, go back and solve the problems.

## I. Multiple Choice

\_\_\_\_\_ 1. What is the area of the region completely bounded by the curve  $y = -x^2 + x + 6$  and the line  $y = 4$ ?

- (A)  $\frac{3}{2}$       (B)  $\frac{9}{2}$       (C)  $\frac{7}{3}$       (D)  $\frac{31}{6}$       (E)  $\frac{33}{2}$

\_\_\_\_\_ 2. The region in the first quadrant bounded by the graph of  $y = \sec(x)$ ,  $x = \frac{\pi}{4}$ , and the axes is rotated about the x-axis. What is the volume of the solid generated?

- (A)  $\frac{\pi^2}{4}$       (B)  $\pi - 1$       (C)  $\pi$       (D)  $2\pi$       (E)  $\frac{8\pi}{3}$

\_\_\_\_\_ 3. The area of the region bounded by the lines  $x = 0$ ,  $x = 2$ , and  $y = 0$ , and the curve  $y = e^{\left(\frac{x}{2}\right)}$  is

- (A)  $\frac{e-1}{2}$   
(B)  $e-1$   
(C)  $2e-1$   
(D)  $2(e-1)$   
(E)  $2e$

## II. Free Response

4. Determine the area of the region bounded by  $y = 2 - x^2$  and  $y = |x|$ .
5. Determine the area of the region bounded by  $x = y^2$  and  $y = x - 2$ .
6. Determine the length of the curve  $y = 2x^{\frac{3}{2}}$  from  $x = 0$  to  $x = 1$ .
7. The region bounded by the x-axis, y-axis, and the portion of the curve  $y = \sqrt{9 - x^2}$  in the first quadrant is revolved around the x-axis. Determine the volume of this solid of revolution.
8. Determine the volume of the solid obtained by revolving the region bounded by  $y = \sqrt{x}$ ,  $x = 9$ , and  $y = 0$  about the y-axis.
9. Determine the volume of the solid obtained by revolving the region in the first quadrant bounded by  $y = x^2$ , the x-axis, and  $x = 3$  about the line  $x = 3$ .
10. Determine the volume of the solid obtained by revolving the region bounded by  $y = \sqrt{x}$ , the x-axis, and the line  $x = 9$  about the line  $x = -1$ .  
Set up but do not integrate the integral.