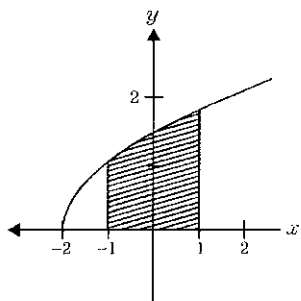


Name: \_\_\_\_\_

Date: \_\_\_\_\_

1. Find the volume of the solid formed by revolving  $f(x) = (x + 2)^{1/2}$  about the  $x$ -axis on the interval  $[-1, 1]$ .

- A.  $\frac{3\pi}{4}$   
 B.  $3\pi$   
 C.  $4\pi$   
 D.  $\frac{12\pi}{5}$



2. Given  $y = \ln x$ . What is the length of the arc of this curve over the interval  $[1, 2]$ ?

- A. 1.015    B. 1.222    C. 3.235    D. 4.128

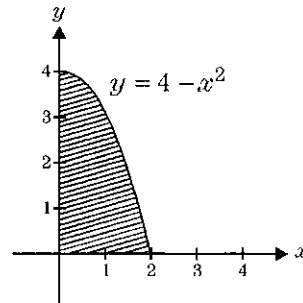
3. The base of a solid is a circular region in the  $xy$ -plane bounded by the graph of  $x^2 + y^2 = 9$ . Find the volume of the solid if every cross section by a plane normal to the  $x$ -axis is an equilateral triangle with one side on the base.

- A. 27    B. 36    C.  $24\sqrt{3}$     D.  $36\sqrt{3}$

4. Find the volume of the solid formed by rotating the area between  $y = x^2$  and  $y = 4x - x^2$  about  $x = 3$ .

5. Which of the following definite integrals represents the area of the shaded region?

- A.  $\int_0^2 (4 - x^2)$   
 B.  $\int_0^2 (4 - x^2) dx$   
 C.  $\int_2^4 (4 - x^2) dx$   
 D.  $\int_0^4 (4 - x^2) dx$



6. Find the volume of revolution by rotating the region  $R$  defined by  $y^3 = x$ ,  $x = 27$ , and  $y = 0$  about the  $y$ -axis.

- A.  $\frac{2197\pi}{9}$     B.  $\frac{2187\pi}{7}$     C.  $\frac{13122\pi}{7}$     D.  $\frac{6561\pi}{3}$

7. Find the volume of the solid generated by revolving the region enclosed by  $f(x) = \sqrt{2x}$ ,  $x = 2$ , and the  $x$ -axis about the  $y$ -axis.

A.  $\frac{20\pi}{3}$     B.  $\frac{32\pi}{5}$     C.  $\frac{16\pi}{3}$     D.  $\frac{48\pi}{5}$

8. Which of the following would yield the area of the region bounded by the graphs of  $y = x$  and  $y = 5x - x^3$ ?

A.  $\int_{-2}^2 (4x - x^3) dx$

B.  $2 \int_0^2 (4x - x^3) dx$

C.  $\int_{-2}^0 (4x - x^3) dx + \int_0^2 (x^3 - 4x) dx$

D.  $2 \int_{-2}^2 (x^3 - 4x) dx$

9. Find the area of the region  $R$  bounded by the curve  $y = \frac{1}{x}$ , and the lines  $x = 1$ ,  $x = 2$ , and  $y = 0$ .

A.  $e$     B.  $4 \ln e$     C.  $2 \ln 2$     D.  $\ln 2$

10. A solid of revolution is generated by revolving the region bounded by  $y = e^x$ ,  $y = 0$ ,  $x = 0$ , and  $x = 1$  about the  $x$ -axis. Find its volume.

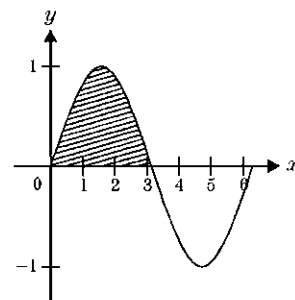
A.  $\frac{\pi}{2}(e^2 - 1)$     B.  $\pi(e^2 - 1)$

C.  $\pi \left(1 - \frac{e^2}{2}\right)$     D.  $\frac{\pi}{2} \left(\frac{1}{2} - e\right)$

11. Given the interval  $[0, \pi]$ , calculate the area between the curve  $y = \sin x$  and the  $x$ -axis.

A. 0    B. 2

C.  $2\pi$     D. 8



12. A solid is formed by revolving the region bounded by  $y = x^3$ ,  $y = 1$ , and  $x = 2$  about the line  $y = 10$ . Which of the following integrals represents the volume of the solid?

A.  $\pi \int_1^2 [81 - (10 - x^3)^2] dx$

B.  $2\pi \int_1^8 y(2 - \sqrt[3]{y}) dy$

C.  $\pi \int_1^2 [1 - (10 - x^3)^2] dx$

D.  $2\pi \int_1^8 (y + 9)(10 - y^3) dy$

13. Find the arc length of  $y = \frac{2}{x}$  from  $x = 1$  to  $x = 4$ .
- A. 2.853   B. 3.512   C. 3.781   D. 4.027

14. Given  $\int_{-1}^1 e^{-x^2} dx = K$ . Find  $\int_0^1 e^{-x^2} dx$ .

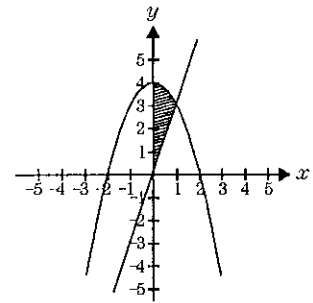
- A.  $\frac{K}{2}$    B.  $\frac{K}{4}$    C.  $2K$    D.  $K^2$

15. Which of the following yields the volume of the solid generated by revolving the region bounded by the graphs of  $y = x^3$  and the line  $y = x$ , between  $x = 0$  and  $x = 1$ , about the  $y$ -axis?

- A.  $\pi \int_0^1 (x^2 - x^4) dx$    B.  $\pi \int_0^1 (y^{1/3} - y)^2 dy$   
 C.  $\pi \int_0^1 (x^4 - x^2) dx$    D.  $\pi \int_0^1 (y^{2/3} - y^2) dy$

16. Let  $R$  be a region in the first quadrant enclosed by the curves of  $y = (2 - x)(2 + x)$ ,  $y = 3x$ , and the  $y$ -axis. Find the volume of the solid generated by revolving the region  $R$  about the  $x$ -axis.

- A.  $\frac{15\pi}{2}$   
 B.  $\frac{158\pi}{15}$   
 C.  $\frac{181\pi}{30}$   
 D.  $16\pi$



17. Let  $y = \sqrt{x}$ . Find the length of the arc of this curve over the interval  $[0, 4]$ .

- A. 3.108   B. 3.982   C. 4.251   D. 4.647

18. The base of a solid is a circular region in the  $xy$ -plane bounded by the graph of  $x^2 + y^2 = 36$ . Find the volume of the solid if every cross section by a plane normal to the  $x$ -axis is a semi-circle with a diameter on the base.

- A.  $\frac{156\pi}{3}$  units<sup>3</sup>   B. 78 units<sup>3</sup>  
 C.  $78\pi$  units<sup>3</sup>   D.  $\frac{78\pi}{3}$  units<sup>3</sup>

19. Find the volume of the solid formed by revolving the region bounded by  $y = \sin x$  and  $y = 0$  in the interval  $[0, \pi]$  about the  $x$ -axis.

- A.  $\pi^3$     B.  $\frac{\pi^2}{2}$     C.  $2\pi$     D.  $\frac{3}{2}\pi$

20. For the interval  $[0, \frac{\pi}{2}]$ , find the area of the region between the curves  $f(x) = \cos x$ ,  $f(x) = \sin x$ .

- A.  $2\sqrt{2} - 2$                       B.  $2\sqrt{2} + 2$   
C.  $3\sqrt{2}$                               D.  $5\sqrt{2}$

21. Find the volume of the solid of revolution formed by revolving the region bounded by  $y = -x + 5$ ,  $y = 0$ , and  $x = 0$  about the  $y$ -axis.

- A.  $\frac{3\pi}{4}$     B.  $5\pi$     C.  $\frac{125\pi}{3}$     D.  $\frac{75\pi}{3}$

22. Find the volume of the solid of revolution obtained by rotating the region  $R$  bounded by  $y = 2x$ ,  $y = 0$ , and  $x = 1$  about the  $x$ -axis.

- A.  $\frac{2\pi}{3}$     B.  $\frac{5\pi}{4}$     C.  $\frac{4\pi}{3}$     D.  $\frac{5\pi}{2}$

23. The base of a solid is a circular region in the  $xy$ -plane bounded by the graph of  $x^2 + y^2 = 36$ . Find the volume of the solid if every cross section by a plane normal to the  $x$ -axis is a square with one side on the base.

- A. 1836    B. 2304    C. 1152    D. 288

24. The region bounded by  $y = x^2$  and  $y = 4$  is rotated about the  $y$ -axis. Find the volume of the formed solid.

- A.  $4\pi$     B.  $\frac{256}{5}\pi$     C.  $\frac{128}{5}\pi$     D.  $8\pi$

25. Find the area above the  $x$ -axis bounded by  $y = e^{2x}$ , from  $x = 1$  to  $x = 4$ .

- A.  $\frac{e^8 - e^2}{2}$  units<sup>2</sup>                      B.  $e^9 - e^3$  units<sup>2</sup>  
C.  $e^8 - e^2$  units<sup>2</sup>                      D.  $\frac{e^2}{3}$  units<sup>2</sup>

26. A solid is formed by revolving the region bounded by  $y = x^3$ ,  $y = 1$ , and  $x = 2$  about the line  $x = 2$ ? Which of the following integrals represents the volume of the solid?

A.  $2\pi \int_1^8 (2-y)(\sqrt[3]{y}-1) dy$

B.  $\pi \int_1^2 [(x^3-1)^2 - 1^2] dx$

C.  $2\pi \int_1^2 (2-x)(x^3-1) dx$

D.  $\pi \int_1^2 [x^3-2]^2 dx$

27. Find the area of the region bounded by the graphs of  $y = x^2 + 4x$  and  $y = 0$ .

A.  $\frac{8}{3}$     B.  $\frac{16}{3}$     C.  $\frac{24}{3}$     D.  $\frac{32}{3}$

28. A wandering ant crawls along the curve  $y = \sin t$ . How far does it travel over the time interval  $[0, \frac{\pi}{6}]$ ?

A. 0.724    B. 0.913    C. 1.102    D. 1.325

29. The first quadrant region bounded by  $y = \sqrt{x-2}$  and  $x = 6$  is revolved about the  $x$ -axis. Determine the volume of the solid of revolution.

A.  $8\pi$     B.  $4\pi$

C.  $\frac{2\pi}{3} + 8$     D.  $6\pi$

30. Find the volume of the solid formed by revolving the region bounded by  $y = x^2$  and  $y = 4$  about the  $x$ -axis.

A.  $\frac{164}{15}\pi$     B.  $\frac{256}{15}\pi$     C.  $\frac{128}{5}\pi$     D.  $\frac{256}{5}\pi$

31. Let  $R$  be the first quadrant region enclosed by the graphs of  $y = -\frac{x^2}{4} + 1$  and  $y = e^x - 1$ .

a) Find the area of  $R$ .

b) Find the volume of the solid generated when  $R$  is revolved about the  $x$ -axis.

c) The region  $R$  is the base of a solid. For this solid, each cross-section perpendicular to the  $x$ -axis is a semi-circle. Find the volume of this solid

32. Let  $R$  be the first quadrant region enclosed by the graphs of  $y = e^{x^2}$  and  $y = -x^2 + 4$ .

a) Find the area of  $R$ .

b) Find the volume of the solid generated when  $R$  is revolved about the  $x$ -axis.

c) The region  $R$  is the base of a solid. For this solid, each cross-section perpendicular to the  $x$ -axis is a square. Find the volume of this solid