Chapter 6 Multiple Choice Review Problems

For Problems 4, 7, 9, and 12 find the area of the region described:

4. The parabola $y^2 = x$ and the line $x + y = 2$.

(A) $\frac{5}{2}$ **(B)** $\frac{3}{2}$ **(C)** $\frac{11}{6}$ **(D)** $\frac{9}{2}$ **(E)** $\frac{29}{6}$

7. The parabolas $x = y^2 - 5y$ and $x = 3y - y^2$.

(A) $\frac{32}{3}$ **(B)** $\frac{139}{6}$ **(C)** $\frac{64}{3}$ **(D)** $\frac{128}{3}$ **(E)** none of these

9. In the first quadrant, bounded below by the x-axis and above by the curves of $y = \sin x$ and $y = \cos x$.

(A) $2 - \sqrt{2}$ **(B)** $2 + \sqrt{2}$ **(C)** 2 **(D)** $\sqrt{2}$ **(E)** $2\sqrt{2}$

12. The curve of $y = x^3 - 2x^2 - 3x$ and the x-axis.

(A) $\frac{28}{3}$ **(B)** $\frac{79}{6}$ **(C)** $\frac{45}{4}$ **(D)** $\frac{71}{6}$ **(E)** none of these

14. The area bounded by $y = e^x$, $y = 1$, $y = 2$, and $x = 3$ is equal to

(A) $3 + \ln 2$ **(B)** $3 - 3 \ln 3$ **(C)** $4 + \ln 2$

(D) $3 - \frac{1}{2}\ln^2 2$ **(E)** $4 - \ln 4$

17. The area enclosed by the curve $y^2 = x(1 - x)$ is given by

(A) $2\int_0^1 x\sqrt{1-x}\,dx$ **(B)** $2\int_0^1 \sqrt{x - x^2}\,dx$ **(C)** $4\int_0^1 \sqrt{x - x^2}\,dx$

(D) π **(E)** 2π

18. The area bounded by the parabola $y = 2 - x^2$ and the line $y = x - 4$ is given by

(A) $\int_{-2}^{3} (6 - x - x^2)\,dx$ **(B)** $\int_{-2}^{1} (2 + x + x^2)\,dx$ **(C)** $\int_{-3}^{2} (6 - x - x^2)\,dx$

(D) $2\int_0^{\sqrt{2}} (2 - x^2)\,dx + \int_{-3}^{2} (4 - x)\,dx$ **(E)** none of these

For problems 25, 27, 29, 31, and 34, find the volume of the solid generated by rotating the given region around the given line:

25. $y = x^2$, $x = 2$, and $y = 0$; about the y-axis.

(A) $\frac{16\pi}{3}$ **(B)** 4π **(C)** $\frac{32\pi}{5}$ **(D)** 8π **(E)** $\frac{8\pi}{3}$

27. $y = x^2$ and $y = 4$; about the x-axis.

(A) $\dfrac{64\pi}{5}$ **(B)** $\dfrac{512\pi}{15}$ **(C)** $\dfrac{256\pi}{5}$

(D) $\dfrac{128\pi}{5}$ **(E)** none of these

29. $y = x^2$ and $y = 4$; about the line $y = -1$.

(A) $4\pi \displaystyle\int_{-1}^{4} (y+1)\sqrt{y}\, dy$ **(B)** $2\pi \displaystyle\int_{0}^{2} (4-x^2)^2\, dx$ **(C)** $\pi \displaystyle\int_{-2}^{2} (16-x^4)\, dx$

(D) $2\pi \displaystyle\int_{0}^{2} (24-2x^2-x^4)\, dx$ **(E)** none of these

31. $y = 3x - x^2$ and $y = x$; about the x-axis.

(A) $\pi \displaystyle\int_{0}^{y2} [(3x-x^2)^2 - x^2]\, dx$ **(B)** $\pi \displaystyle\int_{0}^{2} (9x^2 - 6x^3)\, dx$

(C) $\pi \displaystyle\int_{0}^{2} [(3x-x^2)^2 - x^2]\, dx$ **(D)** $\pi \displaystyle\int_{0}^{3} [(3x-x^2)^2 - x^4]\, dx$

(E) $\pi \displaystyle\int_{0}^{3} (2x-x^2)^2\, dx$

34. $y = \ln x$, $y = 0$, $x = e$; about the line $x = e$.

(A) $\pi \displaystyle\int_{1}^{e} (e-x)\ln x\, dx$ **(B)** $\pi \displaystyle\int_{0}^{1} (e-e^y)^2\, dy$ **(C)** $2\pi \displaystyle\int_{1}^{e} (e-\ln x)\, dx$

(D) $\pi \displaystyle\int_{0}^{e} (e^2 - 2e^{y+1} + e^{2y})\, dy$ **(E)** none of these

38. The base of a solid is the region bounded by the parabola $x^2 = 8y$ and the line $y = 4$, and each plane section perpendicular to the y-axis is an equilateral triangle. The volume of the solid is

(A) $\dfrac{64\sqrt{3}}{3}$ **(B)** $64\sqrt{3}$ **(C)** $32\sqrt{3}$

(D) 32 **(E)** none of these

39. The base of a solid is the region bounded by $y = e^{-x}$, the x-axis, the y-axis, and the line $x = 1$. Each cross section perpendicular to the x-axis is a square. The volume of the solid is

(A) $\dfrac{e^2}{2}$ **(B)** $e^2 - 1$ **(C)** $1 - \dfrac{1}{e^2}$

(D) $\dfrac{e^2-1}{2}$ **(E)** $\dfrac{1}{2}\left(1 - \dfrac{1}{e^2}\right)$