

1–3 Set up an integral that represents the volume by revolving the area around the x -axis.

1. $y = x^2, y = 0, x = 1$ [Ans. $\int_0^1 \pi x^4 dx = \frac{1}{5}\pi$]

2. $y = \sqrt{4-x}, y = 0, x = 0$ [Ans. $\int_0^4 \pi(4-x)dx = 8\pi$] $y = \frac{1}{x}, x = 1, x = 2, y = 0$

3. $y = x^2 - x, y = 0$ [Ans. Notice that the graph is below x -axis, so the volume is $\int_0^1 \pi(-x^2 + x)^2 dx$].

4–7 Set up an integral that represents the volume by revolving the area around the y -axis.

4. $y = 1 - x, x = 0, y = 0$ [$\int_0^1 \pi(1-y)^2 dy$]

5. $y = x^2, x = y^2$ [$\int_0^1 \pi((\sqrt{y})^2 - (y^2)^2) dy$]

6. $y = \sqrt{9-x}, x = 0, y = 0$ [$\int_0^3 \pi(9-y^2)^2 dy$]

7. $y = 9 - x^2, y = 0, 0 \leq x \leq 3$ [$\int_0^9 \pi(\sqrt{9-y})^2 dy$]

8–12 Find the volume of the solid generated by rotating the region bounded by the given curves about the given line.

8. $y = x^2, x = y^2$ about the line $y = 2$ [$\int_0^1 \pi((2-x^2)^2 - (2-\sqrt{x})^2) dx$]

9. $y = x^2, x = y^2$ about the line $x = -1$ [$\int_0^1 \pi((\sqrt{y} + 1)^2 - (y^2 + 1)^2) dy$]

10. $y = x, y = \sqrt{x}$ about the line $y = -1$ [$\int_0^1 \pi((\sqrt{x} + 1)^2 - (x + 1)^2) dx$]

11. $y = x, y = \sqrt{x}$ about the line $x = 2$ [$\int_0^1 \pi((2-y^2)^2 - (2-y)^2) dy$]

12. $y = x^{2/3}, x = 1, y = 0$ about the y -axis [$\int_0^1 (1^2 - (y^{3/2})^2) dy$].

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