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

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

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

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 $y = 2$ [$\int_0^1 \pi \left( (2-x^2)^2 - (2-\sqrt{x})^2 \right) \, dx$]

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

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

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

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