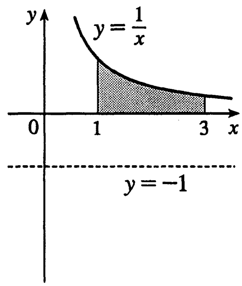
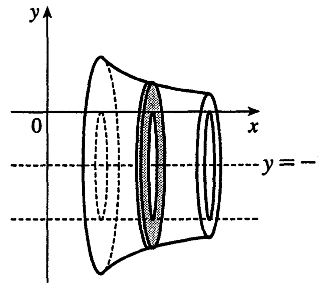
10. $V = \int_1^3 \pi \left\{ \left[\frac{1}{x} - (-1) \right]^2 - [0 - (-1)]^2 \right\} dx = \pi \int_1^3 \left[\left(\frac{1}{x} + 1 \right)^2 - 1^2 \right] dx$

$= \pi \int_1^3 \left(\frac{1}{x^2} + \frac{2}{x} \right) dx = \pi \left[-\frac{1}{x} + 2 \ln x \right]_1^3$

$= \pi \left[\left(-\frac{1}{3} + 2 \ln 3 \right) - (-1 + 0) \right] = \pi \left(2 \ln 3 + \frac{2}{3} \right) = 2\pi \left(\ln 3 + \frac{1}{3} \right)$



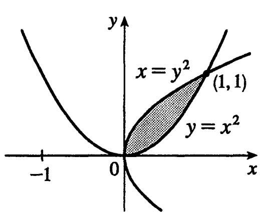


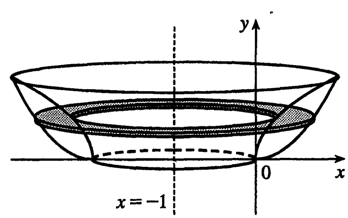
11. $y = x^2 \quad \Rightarrow \quad x = \sqrt{y}$ for $x \geq 0$. The outer radius is the distance from $x = -1$ to $x = \sqrt{y}$ and the inner radius is the distance from $x = -1$ to $x = y^2$.

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

$= \pi \int_0^1 \left(y + 2\sqrt{y} + 1 - y^4 - 2y^2 - 1 \right) dy = \pi \int_0^1 \left(y + 2\sqrt{y} - y^4 - 2y^2 \right) dy$

$= \pi \left[\frac{1}{2}y^2 + \frac{4}{3}y^{3/2} - \frac{1}{5}y^5 - \frac{2}{3}y^3 \right]_0^1 = \pi \left(\frac{1}{2} + \frac{4}{3} - \frac{1}{5} - \frac{2}{3} \right) = \frac{29}{30}\pi$





12. $y = \sqrt{x} \quad \Rightarrow \quad x = y^2$, so the outer radius is $2 - y^2$.

$V = \int_0^1 \pi \left[\left(2 - y^2 \right)^2 - (2 - y)^2 \right] dy = \pi \int_0^1 \left[\left(4 - 4y^2 + y^4 \right) - \left(4 - 4y + y^2 \right) \right] dy$

$= \pi \int_0^1 \left(y^4 - 5y^2 + 4y \right) dy = \pi \left[\frac{1}{5}y^5 - \frac{5}{3}y^3 + 2y^2 \right]_0^1 = \pi \left(\frac{1}{5} - \frac{5}{3} + 2 \right) = \frac{8}{15}\pi$