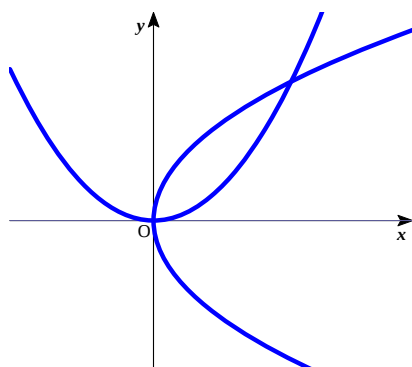


Area and Volume

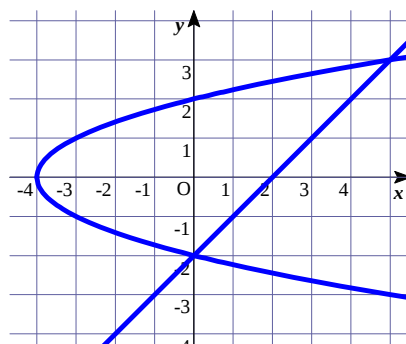
1. Find the area included between the two parabolas

$$y^2 = ax \text{ and } x^2 = by \text{ where } a, b > 0. \quad \left(\frac{1}{3}ab\right)$$



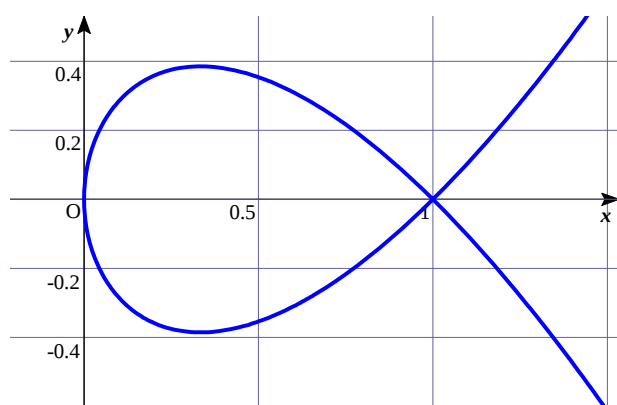
2. Find the area bounded by the curve $y^2 = x + 4$ and the line $y = x - 2$.

$$\left(\frac{125}{6}\right)$$



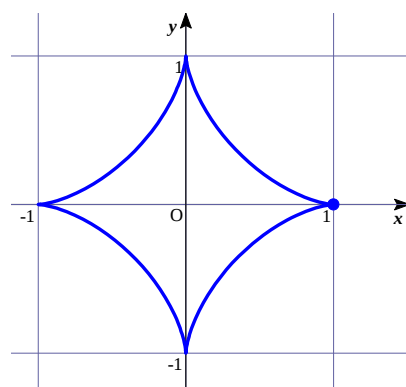
3. The figure shows the graph of $y^2 = x(1-x)^2$.

$$\text{Find the area of the loop.} \quad \left(\frac{8}{15}\right)$$



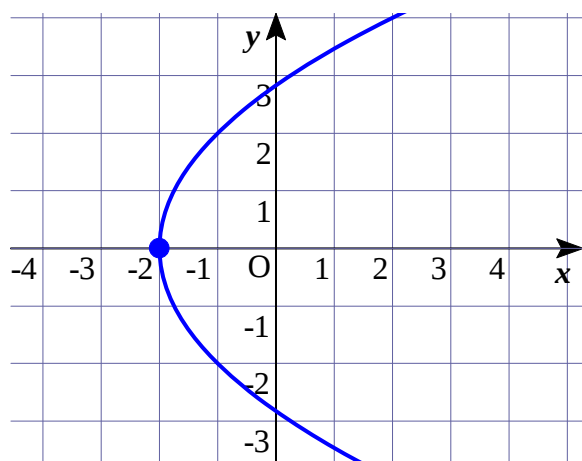
4. The figure shows the graph of the curve with parametric equations $x = \cos^3 t$ and $y = \sin^3 t$.

$$\text{Find the enclosed area.} \quad \left(\frac{3\pi}{8}\right)$$



5. By sketching the graph of the curve with parametric equations $x = t^2 - 2$ and $y = 2t$, find the area enclosed by the curve and the y-axis.

$$\left(\frac{16\sqrt{2}}{3}\right)$$

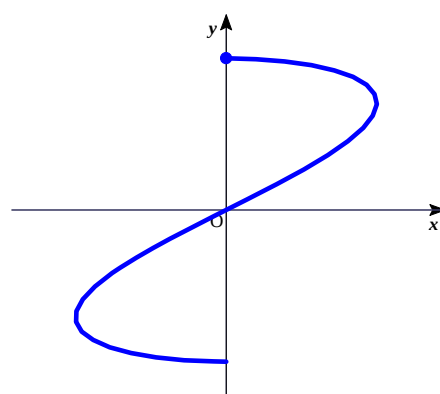


6. The parametric equation of a curve is given by

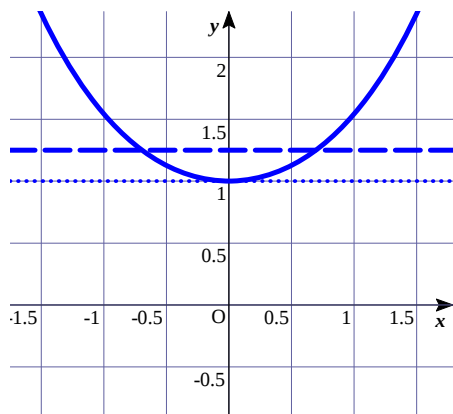
$$\begin{cases} x = a \sin 3t \\ y = b \cos t \end{cases}, \quad 0 \leq t \leq \pi.$$

Find the area bounded by the curve and the y-axis.

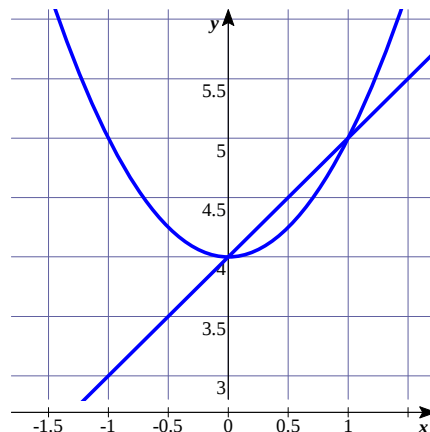
$$\left(\frac{4ab}{3}\right)$$



7. Find the volume generated by revolving the region bounded by the curve $y = \frac{1}{2}(e^x + e^{-x})$ and the line $y = \frac{5}{4}$ about the line $y = 1$. $\left(\frac{33}{16} - \frac{23}{8} \ln 2\right)\pi$

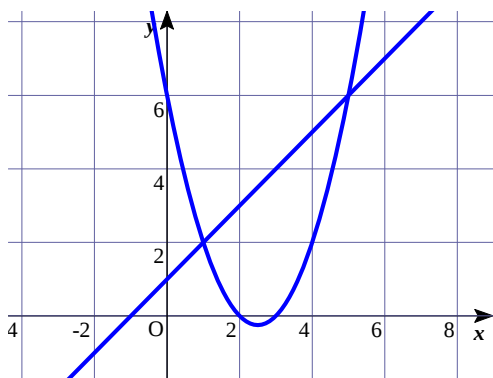


8. Find the volume of the solid generated by revolving the area bounded by the line $x - y + 4 = 0$ and the curve $y = x^2 + 4$ about (a) the x-axis (b) the y-axis (c) the line $x = -4$. (a) $\frac{22\pi}{15}$ (b) $\frac{\pi}{6}$ (c) $\frac{3\pi}{2}$



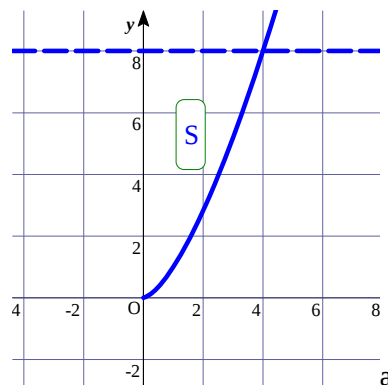
9. A region S is bounded by the curve $y = \sqrt{x^3}$, the y-axis and the line $y = 8$. Find the volume of solid generated by revolving S about

- (a) the y-axis (a) $\frac{384\pi}{7}$
 (b) the x-axis (b) 192π
 (c) the line $x = 4$. (c) $\frac{3456\pi}{35}$



10. Find the volume of solid generated by revolving about the y-axis the region bounded by the parabola $y = x^2 - 5x + 6$ and the straight line $y = x + 1$.

(64π)

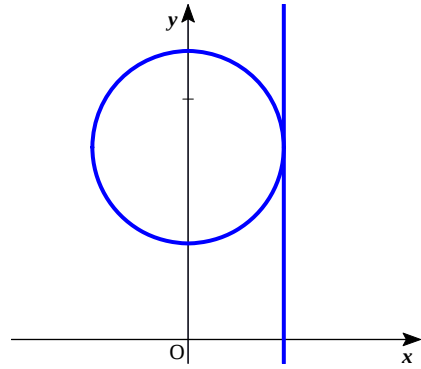


11. Let a and b be two positive real constants. Find the volume of the solid generated by revolving the ellipse $x = a \cos t$, $y = b \sin t$ about

- (a) the line $x = a$, $(2\pi^2 a^2 b)$
 (b) the line $y = b$. $(2\pi^2 ab^2)$

12. A solid is generated by revolving the circle $x^2 + (y - 4)^2 = 4$ about the vertical line $x = 2$. Find the volume of solid so formed.

$$(16\pi^2)$$



13. Find the volume of solid generated by rotating about the line $y = 3$ the region bounded by the parabola $y = 4x - x^2$ and the line $y = 3$.

$$\left(\frac{16\pi}{15}\right)$$

