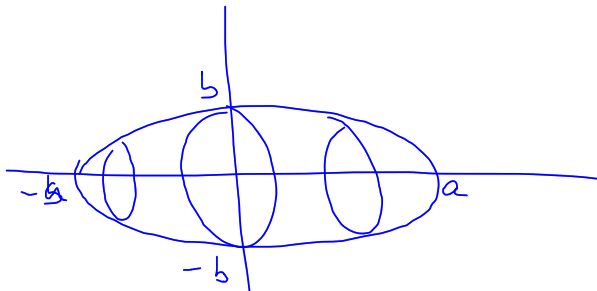


16a)



$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$\frac{y^2}{b^2} = 1 - \frac{x^2}{a^2}$$

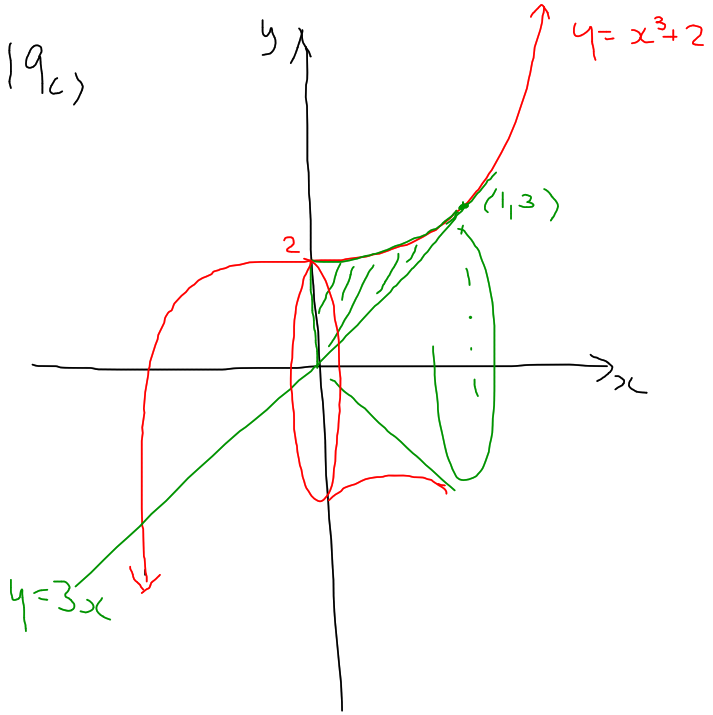
$$y^2 = b^2 - \frac{b^2}{a^2}x^2$$

$$V = \pi \int y^2 dx$$

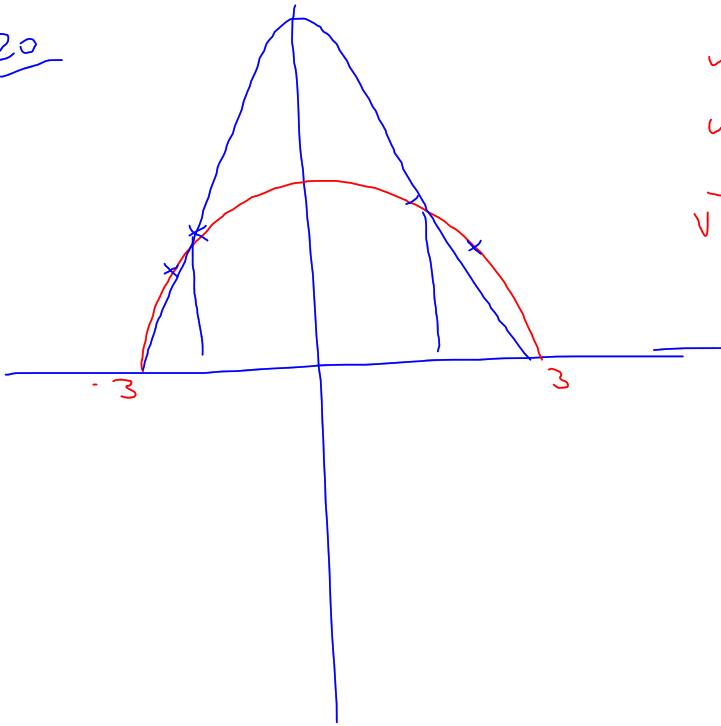
$$= 2\pi \int_0^a \left[ b^2 - \frac{b^2}{a^2}x^2 \right] dx$$

$$= 2\pi b^2 \left[ x - \frac{x^3}{3a^2} \right]_0^a$$

$$= \underline{\underline{\frac{4}{3}\pi ab^2}}$$



20



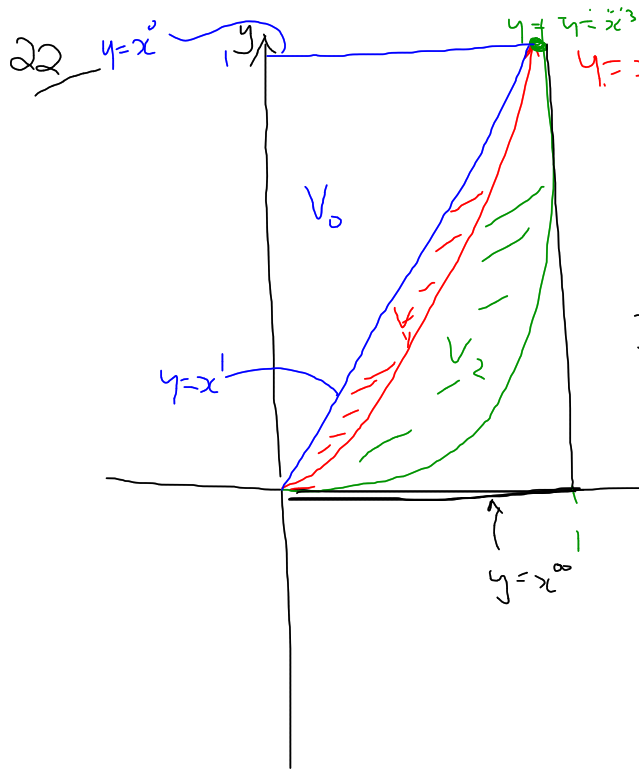
$$y = 18 - 2x^2$$

$$y = \sqrt{9 - x^2}$$

$$\sqrt{9 - x^2} = 18 - 2x^2$$

⋮

$$x = -3, x = -\frac{\sqrt{37}}{2}$$



$$V_n = \pi \left( \frac{1}{2n+1} - \frac{1}{2n+3} \right)$$

$$V_{\text{Cone}} = V_1 + V_2 + V_3 + \dots$$

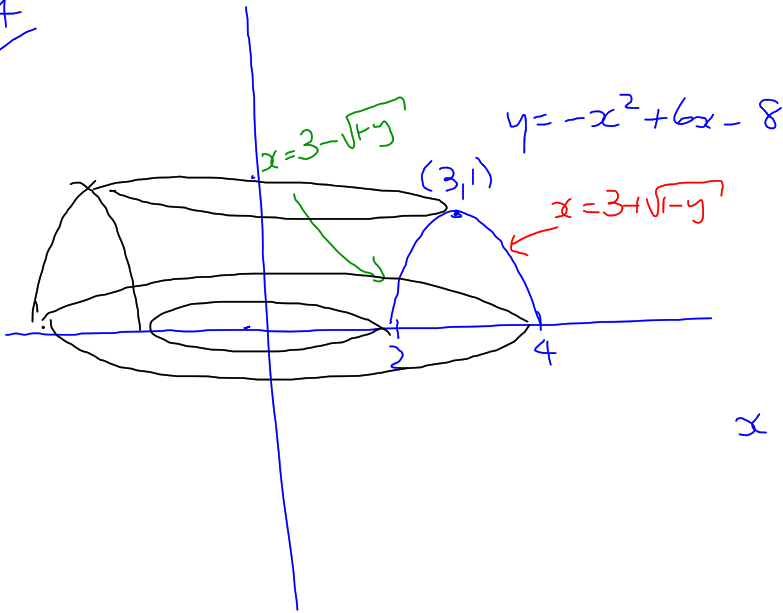
$$\frac{1}{3} \pi (1)^2 (1) = V_1 + V_2 + V_3 + \dots$$

$$\frac{\pi}{3} = \pi \left( \frac{1}{3} - \frac{1}{5} + \frac{1}{5} - \frac{1}{7} + \frac{1}{7} - \frac{1}{9} + \dots \right)$$

$$\frac{\pi}{3} = \pi \left( \frac{2}{3 \times 5} + \frac{2}{5 \times 7} + \frac{2}{7 \times 9} + \dots \right)$$

$$\frac{1}{6} = \frac{1}{3 \times 5} + \frac{1}{5 \times 7} + \dots$$

24



$$-x^2 + 6x - (y+8) = 0$$

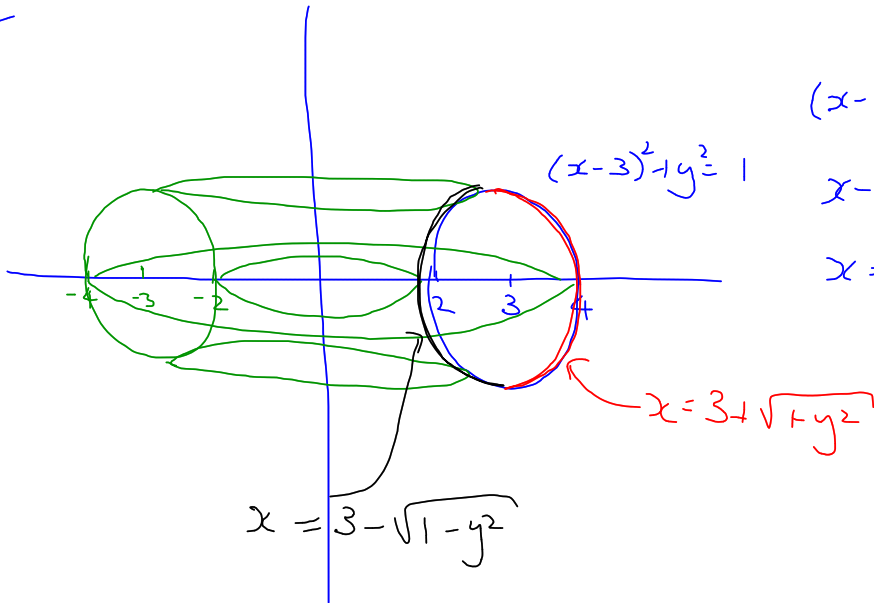
$$x = \frac{-6 \pm \sqrt{36 - 4(y+8)}}{2}$$

$$x = \frac{6 \pm 2\sqrt{9 - (y+8)}}{2}$$

$$x = 3 \pm \sqrt{1-y}$$

$$\begin{aligned}
V &= \pi \int_0^1 \left[ (3+\sqrt{1-y})^2 - (3-\sqrt{1-y})^2 \right] dy \\
&= \pi \int_0^1 4 \times 3 \sqrt{1-y} \, dy \\
&= 12\pi \int_0^1 (1-y)^{\frac{1}{2}} dy \\
&= 12\pi \left[ \frac{(1-y)^{\frac{3}{2}}}{-\frac{3}{2}} \right]_0^1 \\
&= 8\pi \left[ (1-y)^{\frac{3}{2}} \right]_1^0 \\
&= \underline{\underline{8\pi \text{ units}^3}}
\end{aligned}$$

25



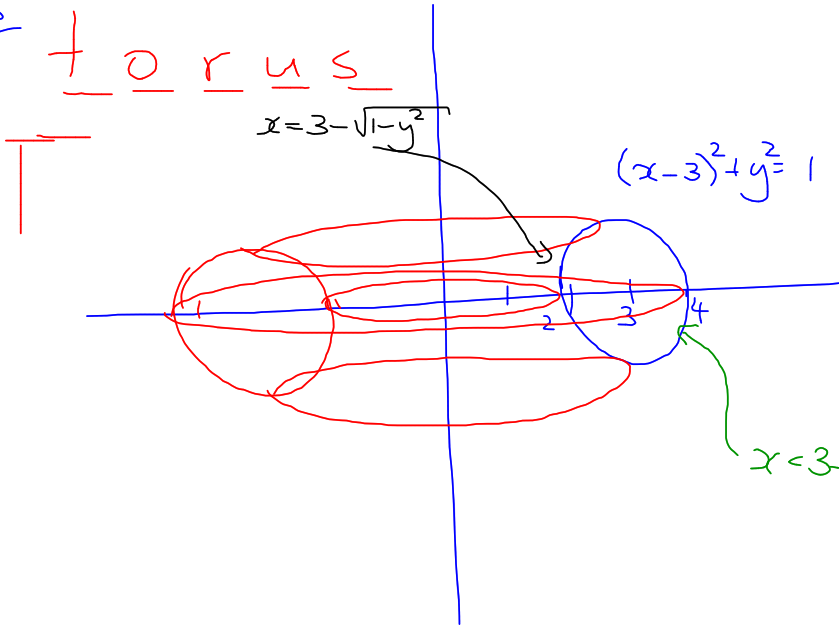
$$(x-3)^2 = 1-y^2$$
$$x-3 = \pm \sqrt{1-y^2}$$
$$x = 3 \pm \sqrt{1-y^2}$$

$$x = 3 + \sqrt{1-y^2}$$

$$x = 3 - \sqrt{1-y^2}$$

25

t o r u s



$$x = 3 - \sqrt{1-y^2}$$

$$(x-3)^2 + y^2 = 1$$

$$(x-3)^2 = 1 - y^2$$

$$x-3 = \pm \sqrt{1-y^2}$$

$$x = 3 \pm \sqrt{1-y^2}$$

$$x = 3 + \sqrt{1-y^2}$$



$$V = 2\pi \int_0^1 \left\{ (3 + \sqrt{1-y^2})^2 - (3 - \sqrt{1-y^2})^2 \right\} dy$$

$$= 24\pi \int_0^1 \sqrt{1-y^2} dy$$

$$= 24\pi \times \frac{1}{4}\pi(1)^2$$

$$= \underline{6\pi^2 \text{ units}^3}$$

