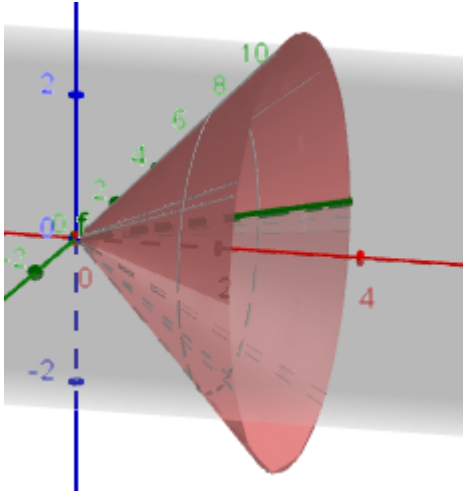


501.

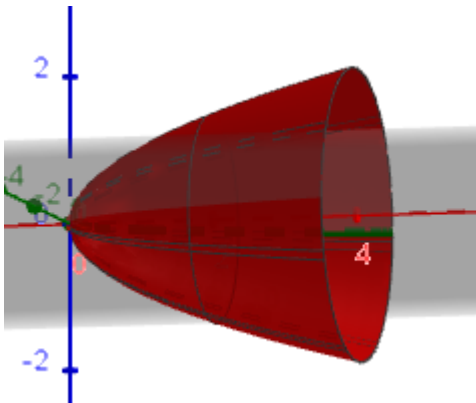
a)



Poikkileikkauksen ala  $A(x) = \pi \cdot r^2 = \pi \cdot f(x)^2 = \pi \cdot x^2$   
 (Tilavuusalkio  $dV = A(x) \cdot dx$ )

$$V = \int_0^3 \pi x^2 dx = \pi \int_0^3 \frac{x^3}{3} = \pi (9 - 0) = 9\pi$$

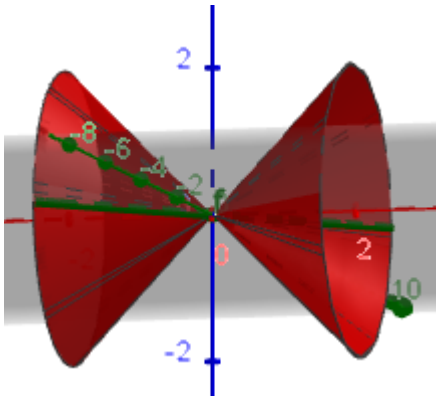
b)



$$A(x) = \pi \cdot (\sqrt{x})^2 = \pi x$$

$$V = \int_0^4 \pi x dx = \pi \int_0^4 \frac{x^2}{2} = \pi (8 - 0) = 8\pi$$

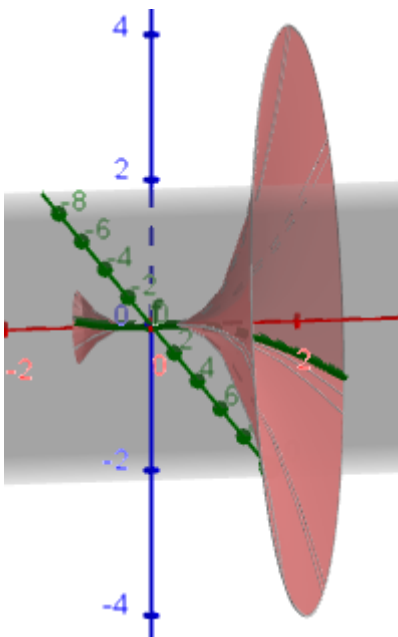
502.



$$A(x) = \pi x^2$$

$$V = \int_{-2}^2 \pi x^2 dx = \pi \cdot \int_{-2}^2 \frac{x^3}{3} = \pi \left( \frac{8}{3} - \frac{-8}{3} \right) = \frac{16\pi}{3}$$

b)

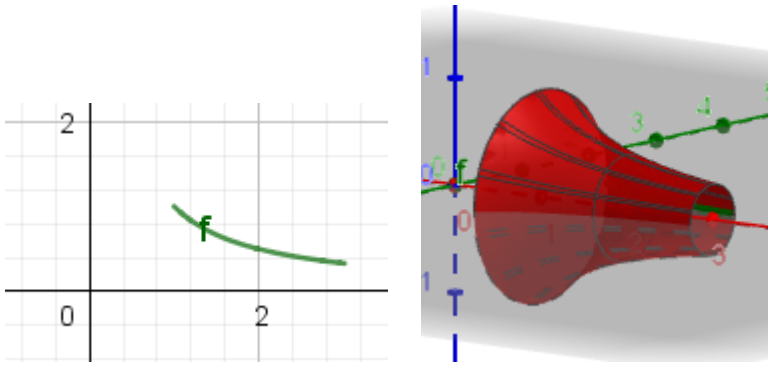


$$A(x) = \pi \cdot \left( \frac{1}{2} x^3 \right)^2 = \pi \cdot \frac{x^6}{4}$$

$$V = \int_{-1}^2 \pi \cdot \frac{x^6}{4} dx = \frac{\pi}{4} \cdot \int_{-1}^2 \frac{x^7}{7} = \frac{\pi}{4} \cdot \left( \frac{128}{7} - \frac{-1}{7} \right) = \frac{129\pi}{28}$$

503.

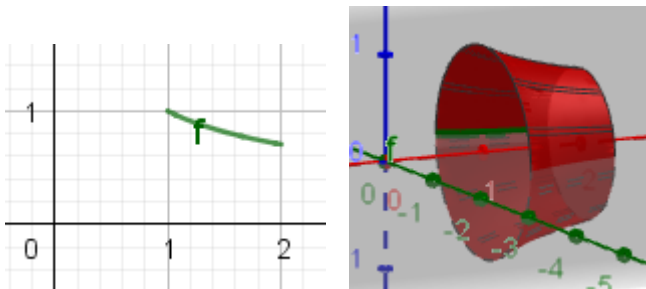
a)



$$A(x) = \pi \cdot \left(\frac{1}{x}\right)^2 = \pi \cdot \frac{1}{x^2}$$

$$V = \int_1^3 \pi \cdot \frac{1}{x^2} dx = \pi \cdot \int_1^3 x^{-2} dx = \pi \cdot \int_1^3 -x^{-1} = \pi \left(-\frac{1}{3} - (-1)\right) = \frac{2\pi}{3}$$

b)



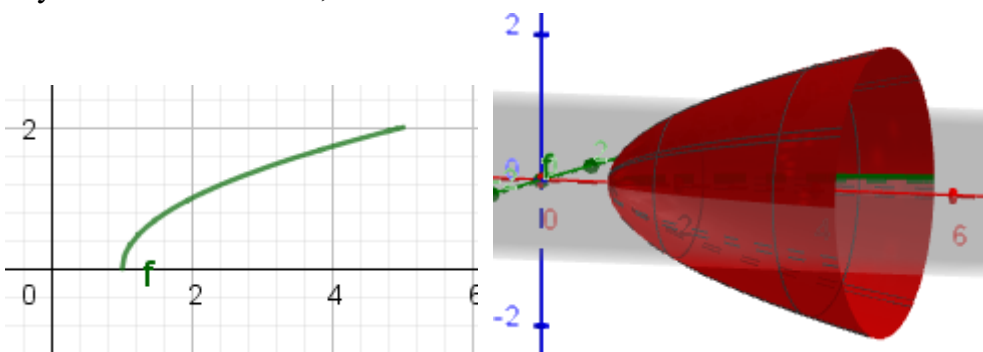
$$A(x) = \pi \cdot \left(\frac{1}{\sqrt{x}}\right)^2 = \pi \cdot \frac{1}{x}$$

$$V = \int_1^2 \pi \cdot \frac{1}{x} dx = \pi \cdot \int_1^2 \ln x = \pi \cdot (\ln 2 - \ln 1) = \pi \cdot \ln 2$$

504.

a)

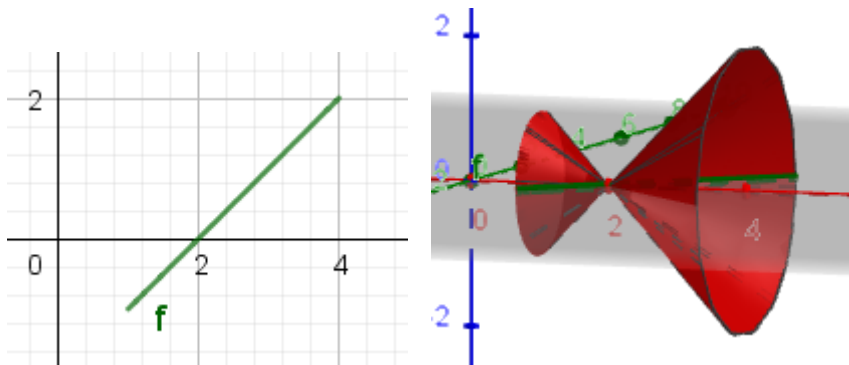
Käyrä leikkaa x-akselin, kun  $x - 1 = 0$  eli  $x=1$ .



$$A(x) = \pi \cdot \sqrt{x-1}^2 = \pi \cdot (x-1)$$

$$V = \int_1^5 \pi \cdot (x-1) dx = \pi \cdot \int_1^5 \left( \frac{1}{2}x^2 - x \right) = \pi \cdot \left[ \left( \frac{25}{2} - 5 \right) - \left( \frac{1}{2} - 1 \right) \right] = 8\pi$$

b)



$$A(x) = \pi \cdot (x-2)^2$$

$$V = \int_1^4 \pi(x-2)^2 dx = \pi \cdot \int_1^4 \frac{(x-2)^3}{3} = \pi \cdot \left( \frac{8}{3} - \frac{-1}{3} \right) = 3\pi$$