

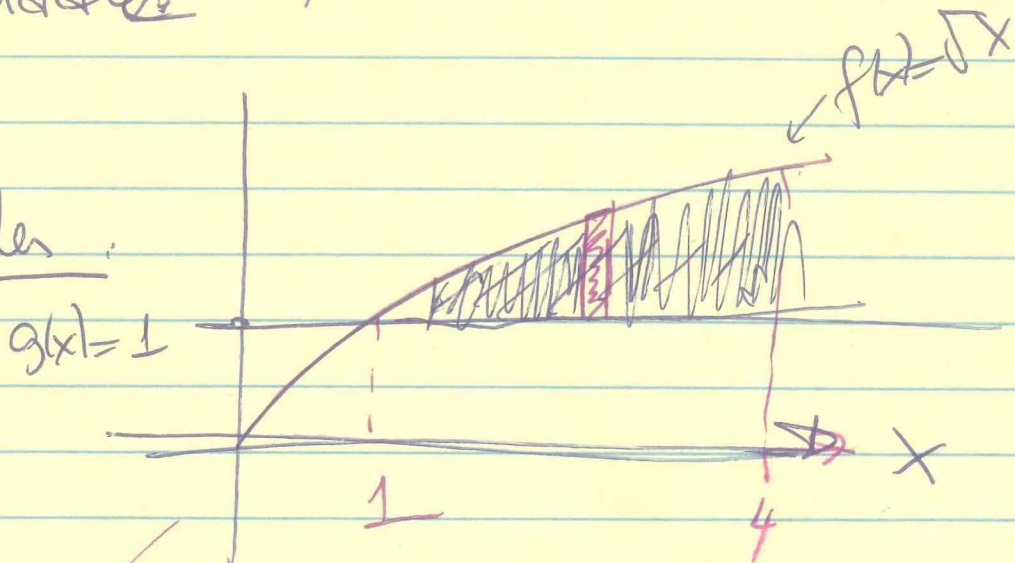
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WASHER METHOD

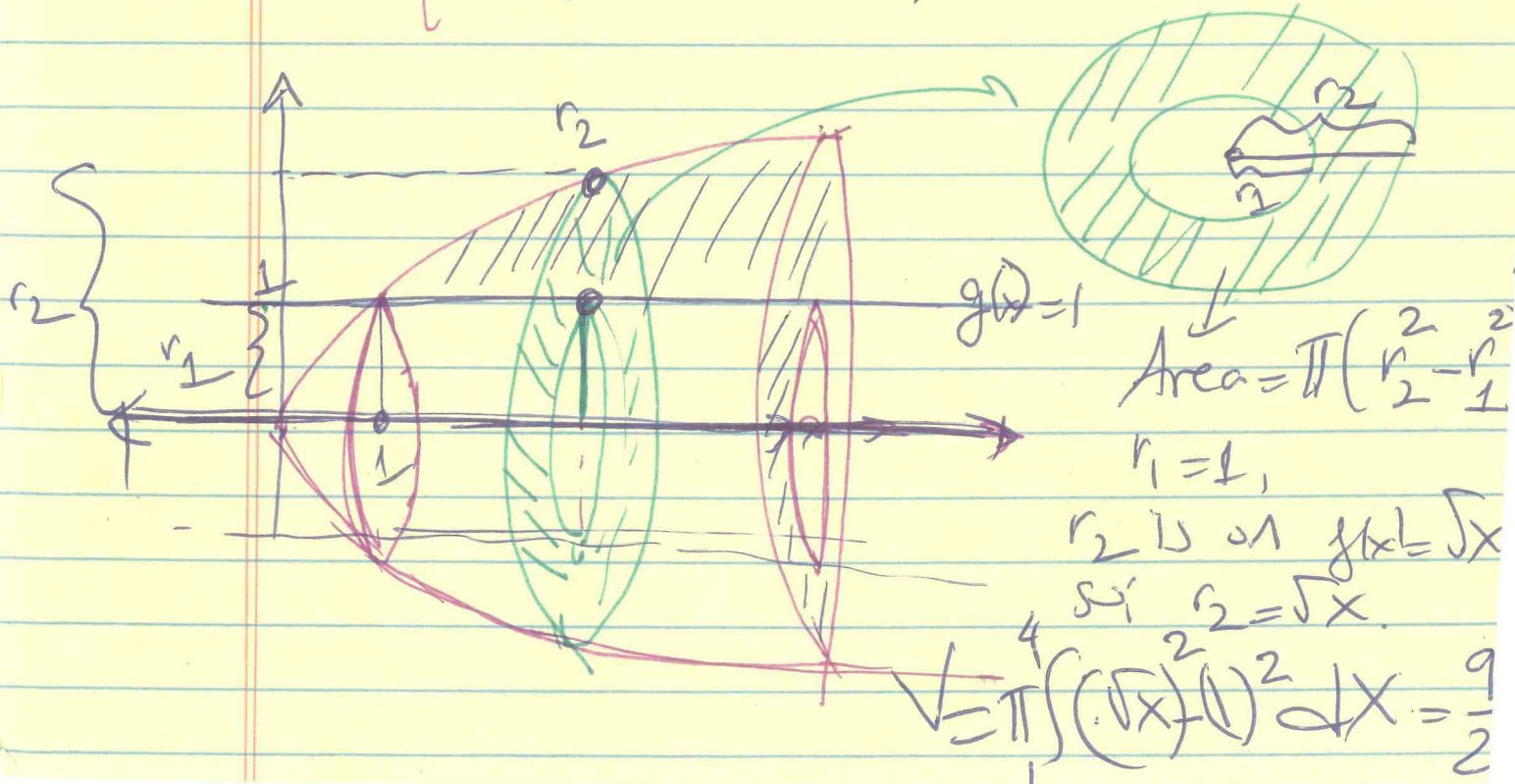
These solids of revolution have cavities in the middle.

EX:

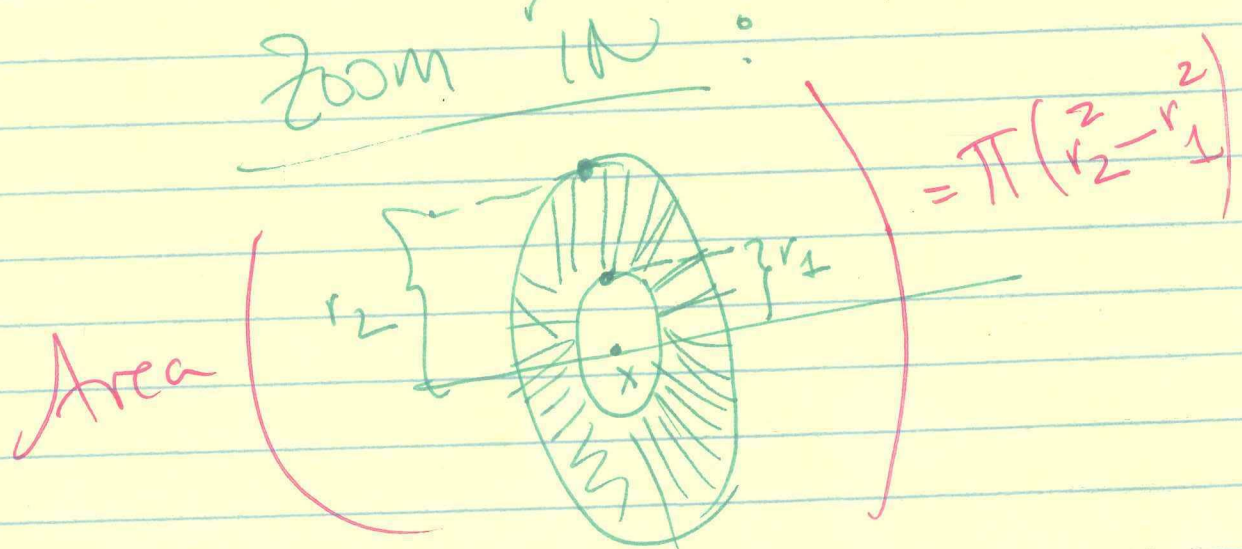
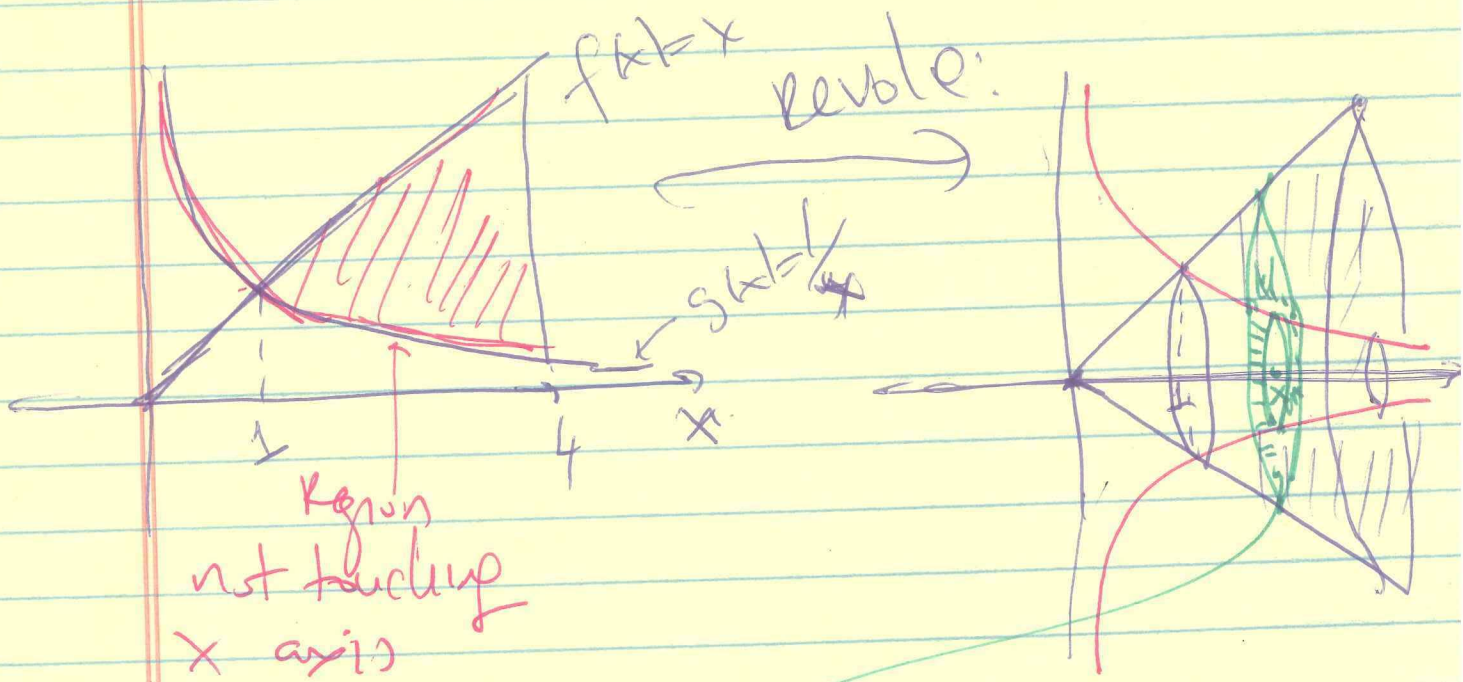
Consider:



Find volume of the solid obtained by revolving this along x axis, from 1 to 4.



ex 2: Find the volume of a solid of revolution
 formed by revolving the region bdd
 above by the graph of $f(x) = x$
 and below by the graph of $g(x) = \frac{1}{x}$
 over interval $[1, 4]$ around the x axis

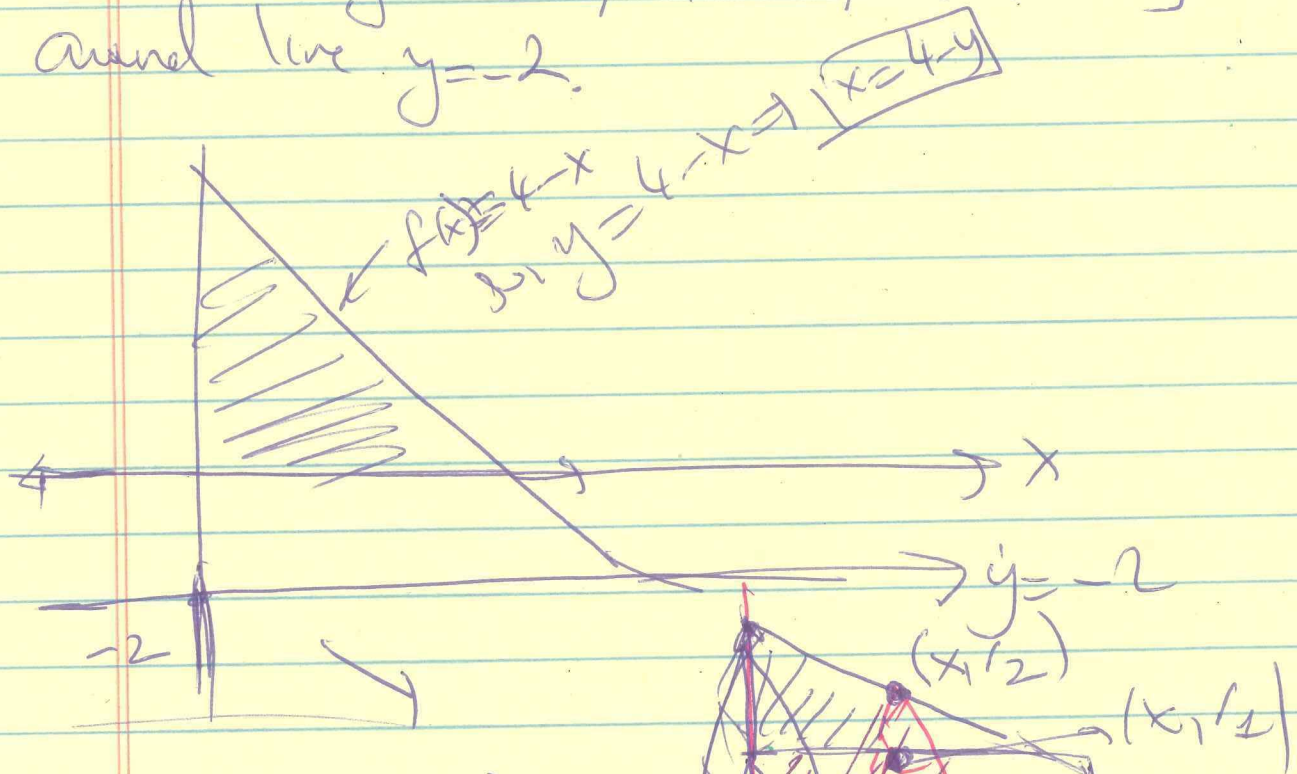


$$\Rightarrow V = \int_1^4 \pi \left[x^2 - \frac{1}{x^2} \right] dx = \pi \left(\frac{x^3}{3} - \frac{1}{x} \right) \Big|_1^4$$

$$= \frac{81}{4} \pi$$

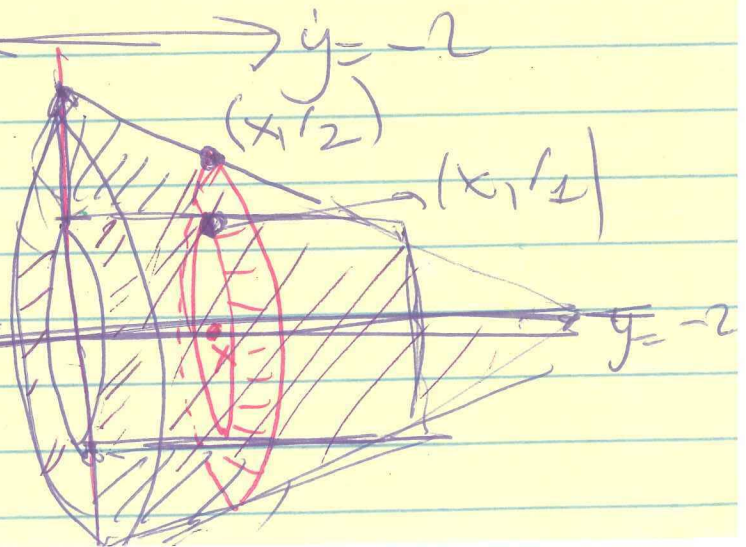
Ex

Find the value of ~~the~~ a solid of revolution obtained by revolving the region bounded by $f(x) = 4-x$, x axis, over $[0, 4]$ around line $y = -2$.



$$\text{Area(Pink slice)} = \pi \cdot [r_2^2 - r_1^2]$$

$$= \pi \cdot [(4-x)^2 - 2^2]$$

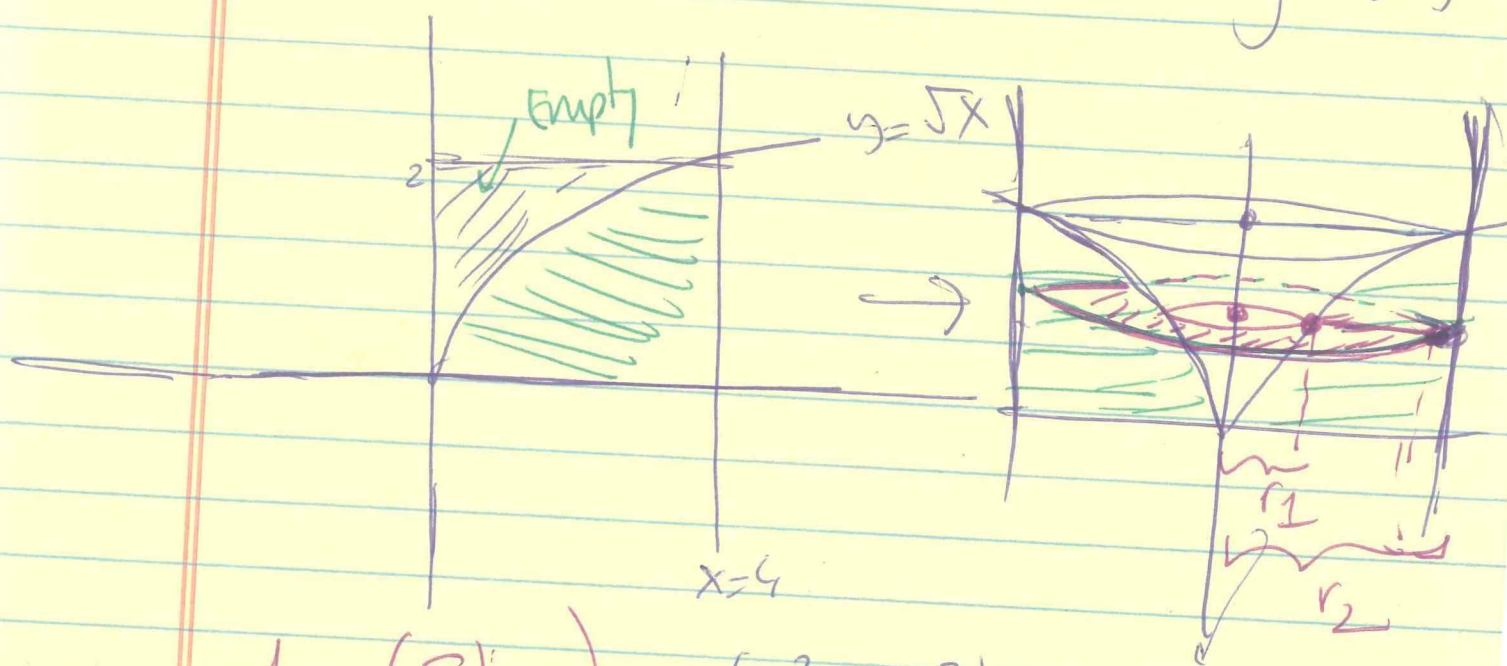


$$\Rightarrow V = \int_0^4 \pi \cdot [(6-x)^2 - 4] dx = \frac{160\pi \text{ units}^3}{3}$$

Ex

$$y = \sqrt{x}, \quad x=4, \quad y=0$$

Find volume when rotated around y-axis



$$\text{Area (Slice)} = \pi \cdot (r_2^2 - r_1^2)$$

r_1 is the first coord. of

(y^2, y)

and r_2 is 4

$$\Rightarrow V = \pi \int_0^2 [4^2 - (y^2)^2] dy$$