

Solutions

Pg 1 ne

Pg 461

#5

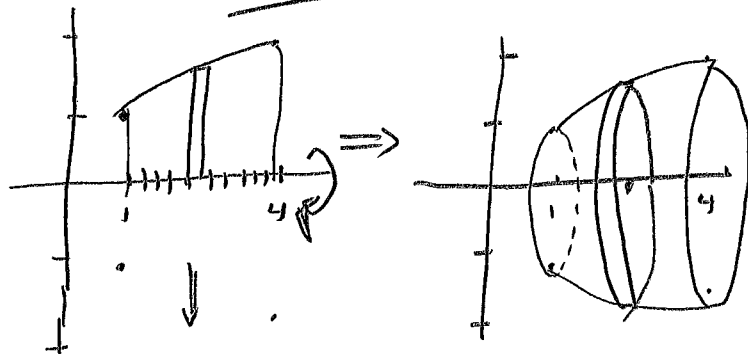
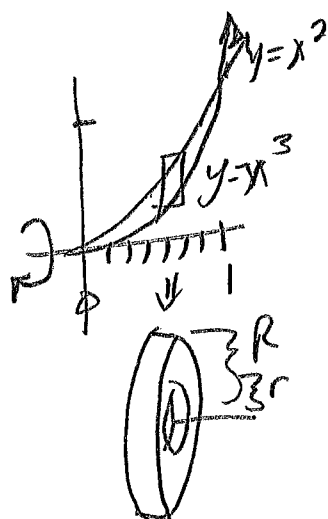


Diagram of a disk with radius $r = \sqrt{x}$ and thickness Δx .

$$V = \pi \int_a^b (\text{radius})^2 (\text{thickness}) \Rightarrow V = \pi \int_1^4 (\sqrt{x})^2 dx$$

#7

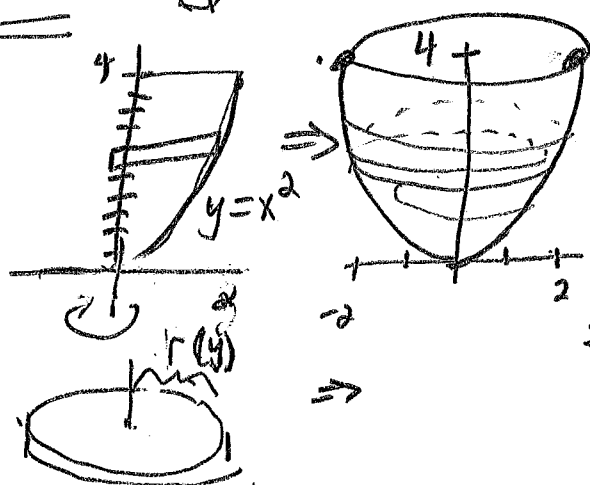


$$V = \pi \int_a^b [(\text{outer radius})^2 - (\text{inner radius})^2] (\text{thickness})$$

so

$$V = \pi \int_0^1 [(x^2)^2 - (x^3)^2] dx$$

#8



so

$$V = \pi \int_0^4 (\text{radius})^2 (\text{thickness})$$

so

$$V = \pi \int_0^4 (\sqrt{y})^2 dy$$

must have function of y .

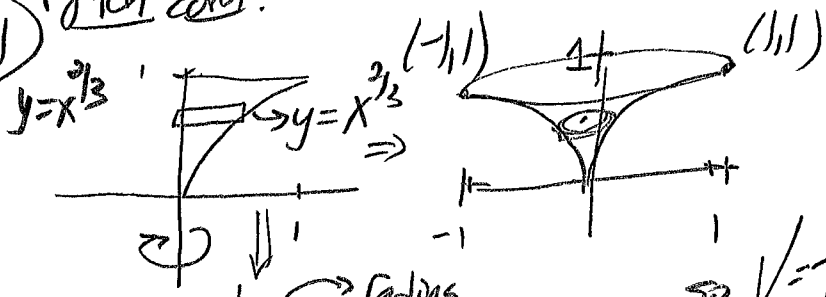
$$y = x^2$$

choose positive

$$\Rightarrow \pm \sqrt{y} = x \Rightarrow \sqrt{y} = x$$

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pg 2nd



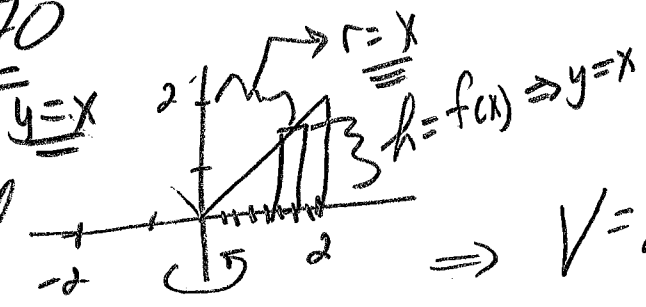
Must have a function as function of $y \Rightarrow y^{3/2} = x$

$$V = \pi \int_0^1 (\text{RADIUS})^2 (\text{thickness})$$

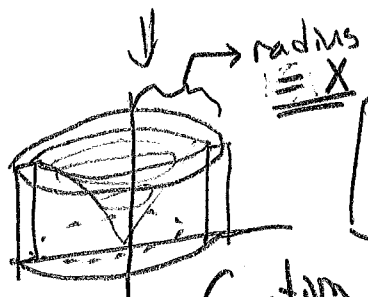
$$= \pi \int_0^1 (y^{3/2})^2 (dy)$$

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#5 shell method



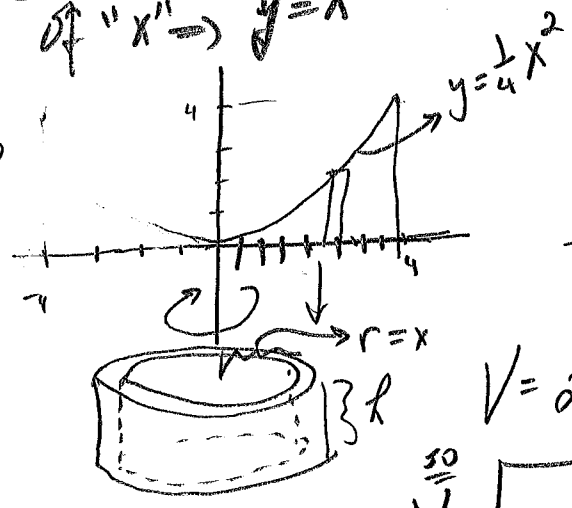
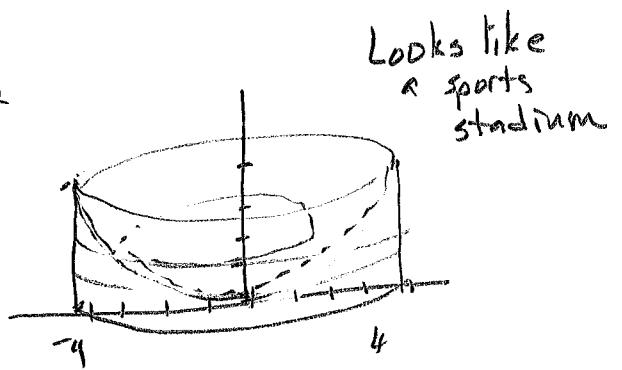
$$V = 2\pi \int_0^2 (\text{radius})(\text{height}) dx$$



$$V = 2\pi \int_0^2 (x)(x) dx$$

we need function of "x" $\Rightarrow y = x$

#7 $y = \frac{1}{4}x^2$
 $y = 0$
 $x = 4$
 about y-axis



Looks like a sports stadium

Partition the x-axis.

$$V = 2\pi \int_0^4 (\text{radius})(\text{height}) dx$$

$$V = 2\pi \int_0^4 (x)(\frac{1}{4}x^2) dx$$

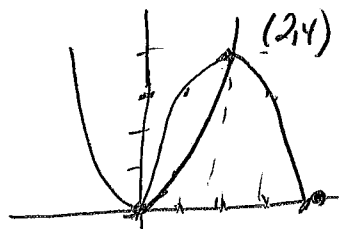
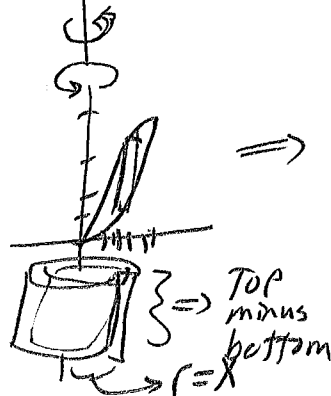
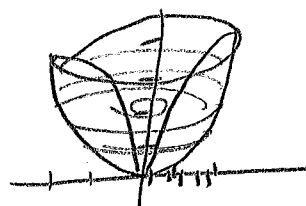
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#9

$$y = x^2$$

$$y = 4x - x^2$$

Partition x-axis



Pg 3 hree

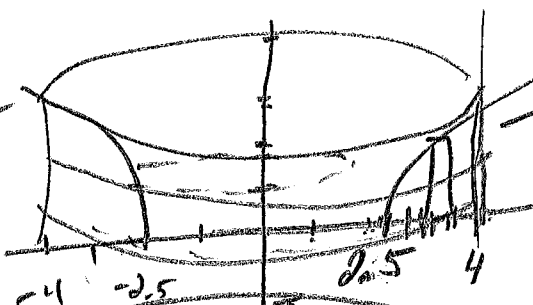
$$\underline{\underline{3D}} \quad V = 2\pi \int_0^2 (\text{radius})(\text{height})(dx)$$

$$\Rightarrow \underline{\underline{3D}} \quad V = 2\pi \int_0^2 (x)[(4x - x^2) - (x^2)] dx$$

#11

$$y = \sqrt{2x - 5}$$

$$y = 0, x = 4$$



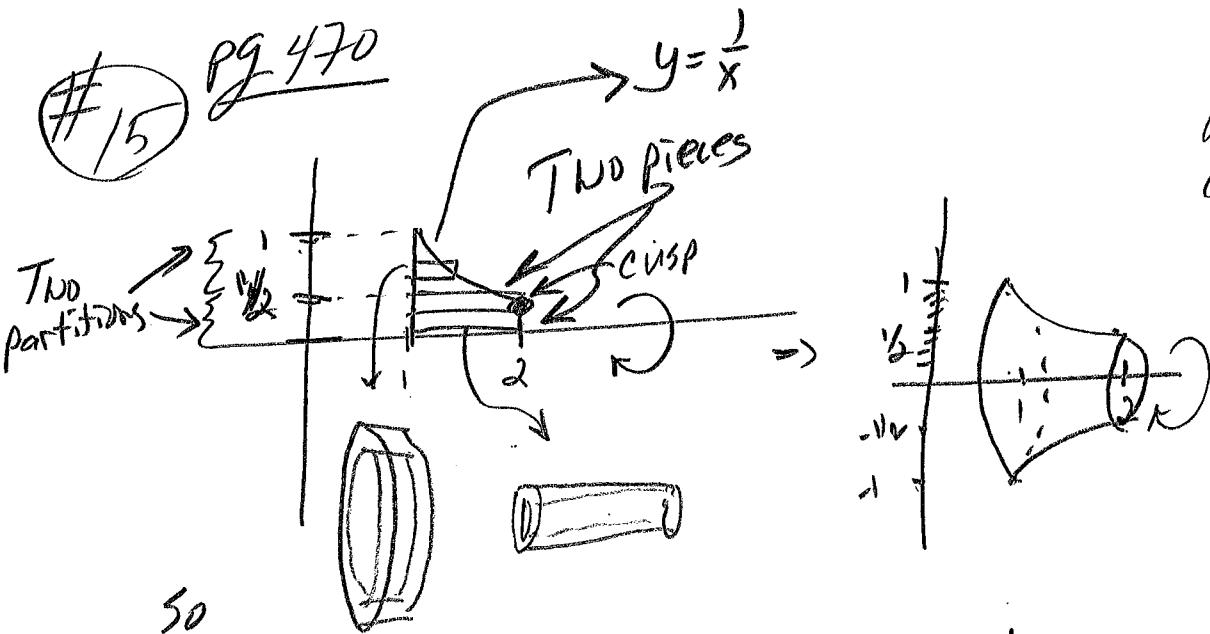
looks like a stadium



$$V = 2\pi \int_{2.5}^4 (x)(\sqrt{2x - 5}) dx$$

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pg 40w



so

$$V = 2\pi \int_{1/2}^1 (\text{Radius})(\text{height})(\text{thickness}) + 2\pi \int_0^{1/2} (\text{radius})(\text{height})(\text{thickness})$$

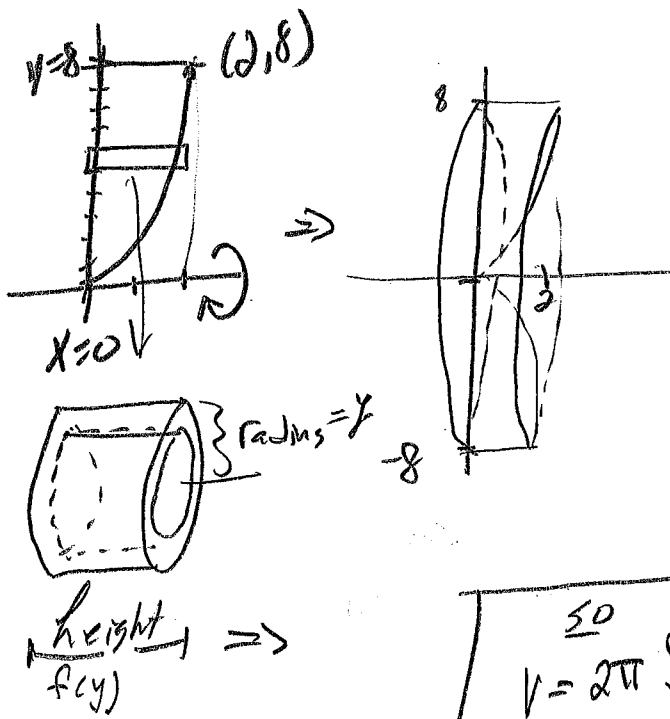
(Right-Left) (Right-Left)

$$= 2\pi \int_{1/2}^1 (y) \left(\frac{1}{y} - 1 \right) dy + 2\pi \int_0^{1/2} (y) (2 - 1) dy$$

Note we need function of y

$$y = \frac{1}{x} \Rightarrow \frac{1}{y} = x$$

#17. $y = x^3$
 $x=0$
 $y=8$
 about x-axis



$$V = 2\pi \int_c^d (\text{Radius})(\text{height})(\text{thickness})$$

$$= 2\pi \int_0^8 (y) (\quad)$$

we want

height = $f(y)$

$\Rightarrow y = x^3$

$\Rightarrow \sqrt[3]{y} = x$

$\Rightarrow f(y) = \sqrt[3]{y}$

so

$$V = 2\pi \int_0^8 (y) (\sqrt[3]{y}) dy$$