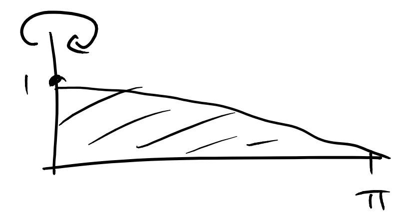
Lecture 8: shells practice

Wednesday, September 3, 2014 12:30 PM

Shells Practice



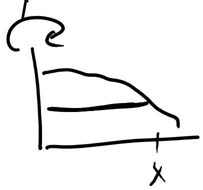
$$f(x) = \begin{cases} \frac{\sin x}{x} & x > 0 \\ 1 & x = 0 \end{cases}$$

revolved about y-axis

Disks

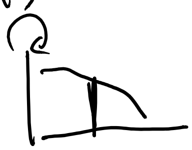
$$\int_{y=0}^{y=1} \pi x^2 \, dy$$

solve for x in terms of y



$y = \frac{\sin x}{x}$ ouch.

Shells



$$\int_{x=0}^{x=\pi} 2\pi x y \, dx \qquad y = \frac{\sin x}{x}$$

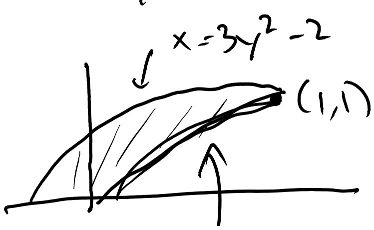
Set up the following problems as integrals:

1. region bounded by $y = \sqrt{x}$, $y = 2$, $x = 0$ about

   a) x-axis

   b) y-axis

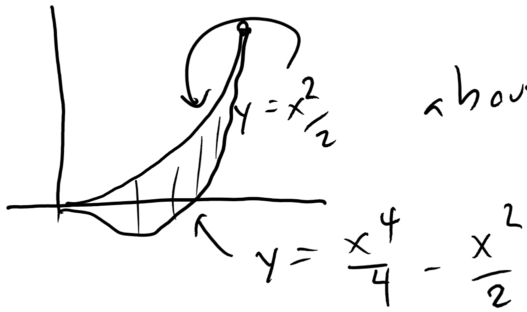
   c) $x = 7$

2. 

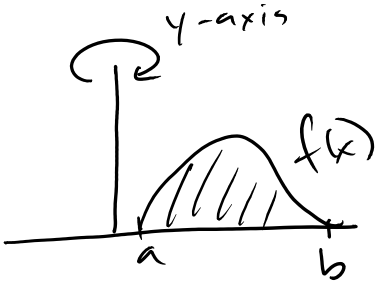
about x-axis

about x-axis

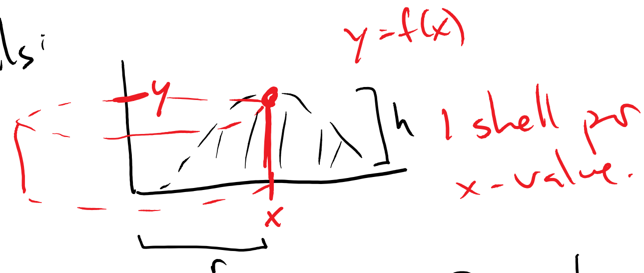
3c



about y-axis



shells:



for shell at x, Area is $2\pi r h$

x y

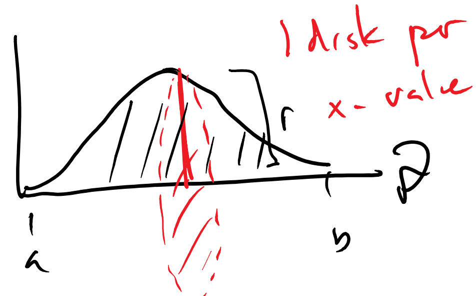
$$V = \int_a^b 2\pi r h \, dx$$

shell for each x

$$= \int_a^b 2\pi x y \, dx = \int_a^b 2\pi x f(x) \, dx$$

solve

Same thing about x-axis



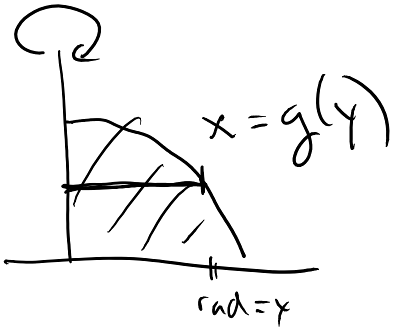
Area of disk is

$$\pi r^2 = \pi y^2$$

$$\int_a^b \pi y^2 \, dx = \int_a^b \pi f(x)^2 \, dx$$

$$\int_a \pi y^2 \, dx = \int_a \pi f(x) \, dx$$

solve



$\int$ ___ dy ← easier choice.

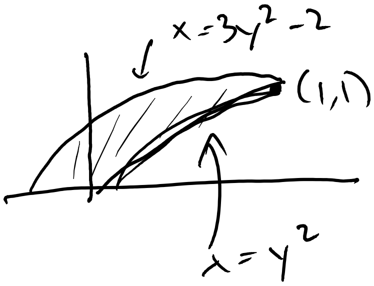
easy to write in terms of y

shells: would have dx

Disks: would have dy ⇝ $\int_{y=a}^{y=b} \pi r^2 \, dy$

x^2

$$\int_{y=a}^{y=b} \pi x^2 \, dy = \int_{y=a}^{y=b} \pi g(x)^2 \, dy$$



about x-axis

shells ⇝ shell for each y-value

$$\int_{y=0}^{y=1} 2\pi r h \, dy$$

$r = y$

h = diff. between x-values on graph.

on graph.

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