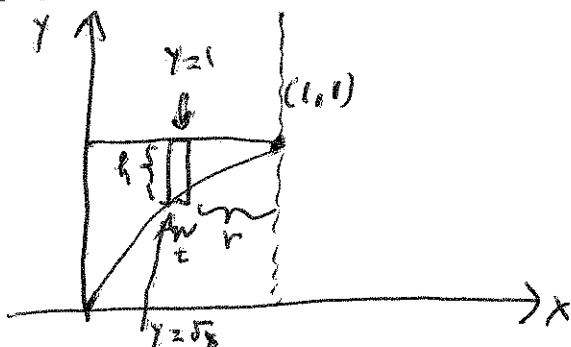


Section 7 Feb 16, 2012

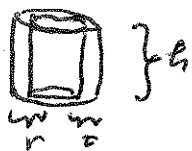
Consider the region bounded by the  $y$ -axis,  $y = \sqrt{x}$ , and  $y = 1$ .

Revolve the region about the line  $x=1$ . Find the volume of the resulting solid.

You must draw a meaningful picture.



Chop the  $x$ -axis from  $x=0$  to  $x=1$ .  
Over each piece of the  $x$ -axis  
draw a rectangle. Revolve the  
rectangle with  $x$ -coordinate  $x$ .  
Get a shell



of volume  $2\pi r h t$

where  $t = 1 - x$

$$h = 1 - \sqrt{x}$$

$$t = dx$$

The volume of one shell is  $2\pi(1-x)(1-\sqrt{x})dx$

The volume of the solid is  $2\pi \int_0^1 (1-x-x^{\frac{3}{2}}+x^{\frac{5}{2}}) dx$

$$= 2\pi \left( x - \frac{x^2}{2} - \frac{2x^{\frac{3}{2}}}{\frac{3}{2}} + \frac{2}{5} x^{\frac{5}{2}} \right) \Big|_0^1$$

$$= 2\pi \left( 1 - \frac{1}{2} - \frac{2}{3} + \frac{2}{5} \right)$$

$$= 2\pi \left( \frac{30 - 15 - 20 + 12}{30} \right)$$

$$= \frac{14\pi}{30} = \boxed{\frac{7\pi}{15}}$$