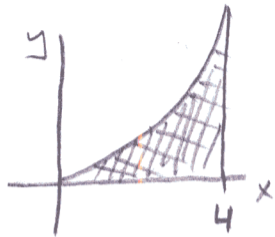


BTM 3.2.8 Find the volume generated by revolving the area defined by the boundaries  $x=4$ ,  $y=0$ ,  $y=x^2$ .



Trading  $x$  and  $z$  for  $r = \sqrt{x^2 + z^2}$  and the usual  $\theta$ , our volume element is  $dV = dy r dr d\theta$

where as  $r$  ranges from 0 to 4,  $y$  ranges from 0 to  $r^2$ :

$$\begin{aligned} V &= \int_0^4 dr r \int_0^{2\pi} d\theta \int_0^{r^2} dy \\ &= 2\pi \int_0^4 dr r r^2 = \frac{\pi}{2} r^4 \Big|_0^4 = 128\pi \end{aligned}$$

