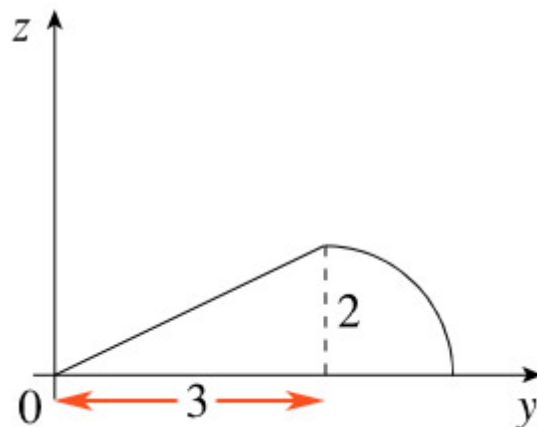


## 11.5 - Ice cream and the chain rule

Consider the solid obtained when rotating the region (right) about the  $y$  axis. The volume of the solid is approximately the volume of ice cream needed to fill and top an ice-cream cone with the dimensions shown.



1. Compute the volume of this solid. (The volume of a cone, though you \*can\* compute it using calculus, is  $V_c = \pi r^2 h / 3$ .)
2. Find the volume  $V(h, r)$  of a similar solid created by rotating a region with dimensions  $h$  and  $r$  instead of 3 and 2.
3. What's the meaning of  $\frac{\partial V}{\partial r}$ ?
4. Suppose that  $h$  and  $r$  are varying with time according to  $h(t) = t + \sin t$  and  $r(t) = e^t - \cos t$ . Compute  $dV/dt$ .