



Here is one arch of the *cycloid*

$$\vec{r}(t) = (t - \sin t)\vec{i} + (1 - \cos t)\vec{j}$$

It is called a cycloid because it is the path traced out by a point on the rim of a wheel rolling *without slipping*. Imagine that a wheel of radius 1 starts resting with the marked point  $P$  on the origin of the  $x$ -axis, and then rolls by rotating  $t$  radians clockwise. Show that the coordinates of  $P$  are now given by  $x = t - \sin t$  and  $y = 1 - \cos t$ .