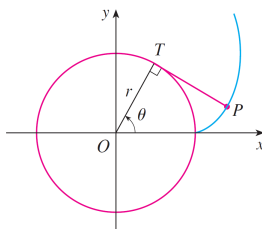


## Section 1.7

1. Parameterizing Lines, Segments, circles, cycloid.
2. Sketch the curve  $(\cos(t), \sin(t))$ ,  $(\sin(t), \cos(t))$ ,  $(-\cos(t), \sin(t))$ ,  $(-\cos(t), -\sin(t))$  for  $0 \leq t \leq 2\pi$ . How about  $0 \leq t \leq 8\pi$ ?
3. Sketch the curve by first “eliminating the parameter” and label the direction as  $t$  increases.
  - (a)  $c(t) = (\sin(t), \cos^2(t))$  on the interval  $[0, 2\pi]$ .
  - (b)  $d(t) = (\frac{1}{2}t, 2t^2)$
  - (c)  $b(t) = (1 + t^{-1}, t^2)$
  - (d)  $e(t) = (\cos(t), \sec(t))$  on the interval  $[0, 2\pi]$
4. A string is wound around a circle and the unwound while being held taut. The curve traced by the point  $P$  at the end of the string is called the **involute** of the circle. If the circle has radius  $r$  and center  $O$  and the initial position of  $P$  is  $(r, 0)$ , and if the parameter  $\theta$  is chosen as is shown below:



Show that a parametrization of the involute is

$$x = r(\cos(\theta) + \theta \sin(\theta)) \quad y = r(\sin(\theta) - \theta \cos(\theta))$$