Math 111
Chapter 10.1: Parametric equations

Goal: We wish to describe the path of a moving particle in 2 dimensions. We would like to allow paths that are curves that could not be described by the familiar $y = f(x)$. An easy solution is to let x and y depend on time t.

(EXAMPLES)

1. $\begin{cases} x = t^2 + 3t \\ y = t - 2 \end{cases}$

2. $\begin{cases} x = \cos t \\ y = \sin t \end{cases}$

for $0 \leq t \leq 2\pi$

3. $\begin{cases} x = \cos 3t \\ y = \sin 3t \end{cases}$

for $0 \leq t \leq 2\pi$

4. $\begin{cases} x = 1 + 6t \\ y = -3 + 2t \end{cases}$

for $0 \leq t \leq 1$

5. $\begin{cases} x = 1 + 6t^2 \\ y = -3 + 2t^2 \end{cases}$

for $-1 \leq t \leq 1$

6. $$\begin{cases} x = \dfrac{1}{2}(e^t + e^{-t}) \\ y = \dfrac{1}{2}(e^t - e^{-t}) \end{cases}$$

for $-\infty \leq t \leq \infty$

7. $$\begin{cases} x = t \\ y = \ln t \end{cases}$$

for $0 < t \leq \infty$

(INTERESTING EXAMPLES) *Get help from computer to plot*

1. $\begin{cases} x = e^{at}\cos t \\ y = e^{at}\sin t \end{cases}$

2. $\begin{cases} x = Ae^{t} \\ y = Ae^{t} + Be^{-t} \end{cases}$

(APPLICATION)
A projectile is launched horizontally from the top of a 125 m tower. If its initial velocity is 15 m/s, how where does it land?