Math 17C
Kouba
Worksheet 3

1.) The position (x_1, x_2) of a particle at time t is given parametrically by each of the following. Eliminate t and write each as an equation in only x_1 and x_2 . Then sketch the graph of the path in the x_1x_2-plane, indicating the direction of motion of the particle.

a.) $\begin{cases} x_1 = t - 2 \\ x_2 = 3t + 12, \end{cases}$ for $-\infty < t < \infty$.

b.) $\begin{cases} x_1 = 1 + 2\cos t \\ x_2 = 2\sin t, \end{cases}$ for $0 \leq t \leq 2\pi$.

c.) $\begin{cases} x_1 = t - 1 \\ x_2 = t^2 - 5t + 4, \end{cases}$ for $t \geq 0$.

d.) $\begin{cases} x_1 = t^2 \\ x_2 = t^6 - 8, \end{cases}$ for $-1 \leq t \leq 2$.

e.) $\begin{cases} x_1 = \sqrt{t+1} \\ x_2 = \sqrt{t}, \end{cases}$ for $t \geq 0$.

f.) $\begin{cases} x_1 = t(t-2) \\ x_2 = (t-1)^4 + (t-1)^2, \end{cases}$ for $t \geq 0$. (Hint: Complete the square for x_1.)

2.) Assume that a path is given parametrically by $\begin{cases} x_1 = t - 3 \\ x_2 = \sqrt{t+1}, \end{cases}$ for $t \geq 0$.

a.) Remove parameter t and write the equation of the path in terms of x_1 and x_2 only. Then sketch the path.

b.) Write an equation for the vector function, $X(t)$, which represents the vector form of these parametric equations.

c.) Compute the velocity vector function, $X'(t)$.

d.) Find and plot the position vector, velocity vector, and speed of motion for $t = 0$, $t = 3$, and $t = 8$.