Notes 10.5 Parametric Equations

- Up until now, we've been representing graphs with a single equation involving 2 variables
- Although those equations tell you WHERE an object has been, it does not tell you WHEN the object was at a certain point.
- By adding a 3rd variable, *t*, which is called a **parameter**, we can determine such time

Definition of a Plane Curve:

If f and g are continuous functions of t on an interval I, the set of ordered pairs $(f(t), g(t))$ is a **plane curve** C. The equations $x = f(t)$ and $y = g(t)$ are **parametric equations** for C, and t is the **parameter.**

Sketching a Plan Curve:

- Plot points in the *xy*-plane in order of the increasing parameter
- Each point is determined by *t* (parameter)
- Trace the curve in order of points, this is called the **orientation** of the curve

Ex. 1 Sketch the graph $x = t$ and $y = -2t, \quad -2 \leq t \leq 2$

Ex. 2 a.) Sketch the graph $x = \sqrt{t}$ and $y = 1 - t, \quad t \geq 0$

b.) In part a, we can **eliminate the parameter** to find the rectangular equation.

Ex. 3 a.) Sketch the graph $x = 2\cos\theta$ and $y = 2\sin\theta$; $0 \leq \theta \leq 2\pi$,

b.) Eliminate the parameter to find the rectangular equation

Finding a set of parametric equations for a given rectangular equation is not unique. See example 5 pg. 735

Ex. 4 Find two different sets of parametric equations for the given rectangular equation.

Use a.) $t = x$ and b.) $t = 2 - x$ for $y = 4x - 3$