Reading 3 (Due Monday 8/4/25 by 5PM)

Directions: Read the following sections of the book:

- Section 9.5.1
- Section 9.5.2
- All of Section 9.6. **I'm not going to lecture on this section at all during class.**

and complete the following tasks along the way. If an Activity is not listed, you do not need to complete it (although you are welcome to read it). Turn your write up in via gradescope. You do not need to write the questions down, as long as you clearly indicate the question number.

1. Read the learning objectives from this week (they can be found in Reading 1 & 2). Write a short reflection on your learning progress for this week relative to the learning objective. Your reflection could include responses to the following questions: Which objectives do you feel most confident about? Which objectives seem the most challenging? Which activities/resources helped you understand a specific topic? Are you approaching challenging objectives with a growth mindset? Did you experience any productive failure this week?
2. Complete Preview Activity 9.5.1.
3. Complete Activity 9.5.2.
4. Complete Preview Activity 9.6.1.
5. Activity 9.6.2. I recommend using GeoGebra to graph the curves. You can find directions online for plotting parametric curves with GeoGebra. You are not required to include the graphs in your write-up.
6. Activity 9.6.3. You do not need to submit anything for part (e). I recommend using GeoGebra or GeoGebra 3D. You are not required to include the graphs in your write-up.

Basic learning objectives: These are the tasks you should be able to perform with reasonable fluency **when you arrive at our next class meeting**. Important new vocabulary words are indicated in italics.

1. Compute the *vector equation of a line* given a point contained in the line and the direction of the line. Compute the *parametric equations of a line*. Given a parametrization of a line, determine its direction.
2. State the definitions of *vector-valued functions*, the graph of a vector valued function, and the parametric equations of a curve. Describe the relationship between vector-valued functions and parametric equations.
3. State various examples of vector-valued functions and parametric curves.
4. Graph parametric curves using a graphing calculator or other appropriate technology (like GeoGebra or Desmos).
5. Parameterize simple curves such as lines and circles and ellipses in $\mathbb{R}^2$ or $\mathbb{R}^3$.

Advanced learning objectives: In addition to mastering the basic objectives, here are the tasks you should be able to perform **after class, with sufficient practice:**

1. Determine the relationship between two lines. Are they equal? Parallel? Perpendicular? Do they intersect?
2. Determine when two nonzero vectors are parallel. Determine when three points in $\mathbb{R}^3$ are collinear. Determine when three vectors in $\mathbb{R}^3$ are coplanar. Understand the geometric intuition behind the solutions to these types of problems.
3. State the definition of a plane and understand why a plane can be specified uniquely by a point in the plane and a vector perpendicular to the plane.
4. Understand several different ways to describe the equation of a plane. Compute the equation of a plane given various geometric parameters.
5. Determine the relationship between two planes or a line and a plane. Are they parallel? Perpendicular? Do they intersect?
6. Parameterize the intersection of two (simple) graphs or surfaces (e.g. the interesection of two planes, the intersection of a cone and a cylinder, the traces and level curves of a function).