Math 110 - Homework 4
Topic: Lines and planes in $\mathbb{R}^3$

Due at 6:00pm (Pacific) on Friday, October 8, submitted through Crowdmark.

Practice

Before beginning the graded portion of this worksheet, we **strongly** recommend that you practice the basic techniques related to this week's material. Mastering the techniques used in these questions is essential for completing the rest of the worksheet, as well as for success on the tests and exam. The relevant questions this week are from Section 2.3 of the online textbook.

MATLAB

Each week we will provide you with a list of new MATLAB commands relevant to the material on the worksheet. You are welcome, and in fact encouraged, to use MATLAB for the calculations in Part II of the worksheet. On Part I you must do the calculations by hand and show your work.

This week's material does not include new computations, just new ways of understanding computations we've already done. As a result, there are no new MATLAB commands needed this week.

Graded questions

The questions on the following page are the ones to be submitted for grading. You are permitted to discuss these questions with other students, your tutorial TA, or your instructors - however, the final product that you submit must be written in your own words, and reflect your own understanding. You are **not** permitted to post these questions anywhere on the internet. Your final solutions should be understandable by a student who has been keeping up with this course but does not have any knowledge of the material beyond what we have seen in class - in particular, if you have seen techniques from matrix algebra that have not yet been discussed in the course, do not use them in your solutions.

Part I: Calculation by hand

For all questions in this section you must show all of the details of your calculations. Credit will be given only if you show the steps by which you obtain your final answer.

1. Find a vector form equation for the plane in $\mathbb{R}^3$ with general form equation

$$3x - 5y + z = 2.$$

2. Find general form equations for the line in $\mathbb{R}^3$ that passes through $(0, 2, 1)$ and $(1, -2, 2)$.

3. Let L_1 be the line in $\mathbb{R}^3$ defined by the general form equations:

$$x + y - z = 1$$

$$x + 4y = 2$$

Let L_2 be the line in $\mathbb{R}^3$ that contains the points $(1, 2, 3)$ and $(6, -1, 4)$. There is exactly one plane in $\mathbb{R}^3$ that contains both L_1 and L_2. Find a general form equation for this plane.

Part II: Concepts and connections

There are no Part II questions this week, as we aim to keep this assignment somewhat shorter than usual due to Wednesday's test.