MATH 210
Homework 2
Due: Saturday 09/16/2020 11:59 PM

The present assignment is based on equations of lines and planes

1. Consider the planes $2x + y - z = 2$ and $x - y + z = 1$. They intersect along a straight line. Determine a vector equation for their intersection.

2. Consider the plane $x - y + z = 3$ and the straight line with equation $\mathbf{r}(t) = \langle 2t + 3, t + 5, 1 - 2t \rangle$.

   a. Determine whether the line and the plane intersect. If they do, then find their point of intersection

   b. Determine whether the point $(1, 4, 3)$ belongs to the plane or not.

   c. Determine whether the point $(1, 4, 3)$ belongs to the line or not.

   d. Determine whether the given line intersects with the line with equation $\mathbf{l}(t) = \langle t + 2, 2t + 1, t \rangle$.

3. Consider the line with vector equation $\mathbf{r}(t) = \langle t, 3t - 2, t + 1 \rangle$ and the point $(1, 3, 2)$.

   a. Find the equation of the plane that contains both the given line and the given point.

   b. Find the equation of the plane that contains the given point and is perpendicular to the given line.