Worksheet, Feb 3

0.1. **Lines and Planes.**

(1) Find a plane P that contains the origin and the line ℓ defined by

$$\begin{aligned} x =& t + 1 \\ y =& -1 \\ z =& -t \end{aligned}$$

(2) Using the same line and plane from the above example, find a new line ℓ_1 which
- Contains the origin
- Is perpendicular to our original line ℓ.

(3) Why is it that ℓ_1 is contained in the plane P?

(4) Find a unit vector perpendicular to the plane $3x + y - z = 2$.

(5) Show that if P_1, P_2, P_3 all contain a common line, then the normal vectors $\hat{n}_1, \hat{n}_2$, and $\hat{n}_3$ to these planes all lie in the same plane.

(6) Describe an algorithem which finds the minimal distance between 2 lines (which does not involve taking a derivative!) *Hint: Set up the first line as* $t\vec{v}_1 + p_1$ *and the second as* $s\vec{v}_2 + p_2$.