Math 9 Fall 19 Homework 3 (Due on Oct 9 before class)

(1) (3 pts each) Let $P(5,8,0)$, $Q(1,3,1)$ and $R(2,4,11)$ be three points in the space.
   (a) Is the triangle ΔPQR obtuse? Justify your answer.
   (b) Find the area of the triangle ΔPQR.

(2) (3 pts) Let

$$\mathbf{p}(t) =< 2,1,2 > +t < 3,1,-1 >$$

$$\mathbf{q}(t) =< 2,3,1 > +t < -2,3,-1 >$$

be vector equations of two lines in the space. Determine whether they are parallel, whether they intersect in a point, or are skew.

(3) (3 pts) Let $\mathbf{u} =< 2,,3,1 >$ and $\mathbf{v} =< 1,-1,2 >$. Find the scalar and vector projections of $\mathbf{u}$ onto $\mathbf{v}$. Then write $\mathbf{u}$ as the sum of a vector parallel to $\mathbf{v}$ and a vector orthogonal to $\mathbf{v}$.

(4) (3 pts) Find the equation of the plane containing $(4,2,9)$ and the line of intersection between $2x+3y-z=1$ and $x-y-z=0$.

(5) (3 pts) Find the plane consisting of points equidistant from $(2,3,-1)$ and $(1,-1,2)$.