1. Decide whether or not the following sets of vectors are linearly independent. If they are find the area/volume of the region formed by the vectors.

\[ \vec{v}_1 = (1, 2, 3) \]
\[ \vec{v}_2 = (-1, -2, -3) \]

\[ \vec{u}_1 = (1, 3, 2) \]
\[ \vec{u}_2 = (1, 6, 4) \]

\[ \vec{w}_1 = (1, 4, 2) \]
\[ \vec{w}_2 = (-1, 5, 3) \]
\[ \vec{w}_3 = (2, 4, 6) \]

\[ \vec{x}_1 = (1, 3, 2) \]
\[ \vec{x}_2 = (1, 6, 4) \]
\[ \vec{x}_3 = (3, 12, 8) \]

2. Let a triangle \( T \) be have edges \( u_1, u_2 \) (as defined above) and \( u_1 - u_2 \). Find the area of \( T \).
3. Give parametric equations for a plane containing the lines

\[ \ell_1 = (t + 2, 3t - 5, 5t + 1) \]
\[ \ell_2 = (5 - t, 3t - 10, 9 - 2t) \]

- Give a point and normal vector which specify this plane.

- Give an explicit equation for the plane.

- Find an equation for the plane orthogonal to the line \( \ell_1 \) passing through the point \( \ell_2(0) \)

4. A plane is given by the equation

\[ 3x + 7y - z = 0 \]

- Find parametric equations for the same plane.

- Write the plane in the form of normal vector at a given point.

- Find the intersection of the 2 planes given in problems 3 and 4.