First Homework
Due: Thursday, February 16

1. In $\mathbb{R}^4$, let $\mathbf{a} = (-1, 1, -1, 1)$, $\mathbf{b} = (0, 2, 0, 0)$ and $c = (0, 1, 2, 2)$

   (a) Compute $3\mathbf{a} - 4\mathbf{b} + \mathbf{c}$.

   (b) Find $|\mathbf{a}|$, $|\mathbf{b}|$, and $|\mathbf{c}|$.

   (c) Find the angle between $\mathbf{a}$ and $\mathbf{b}$.

2. In $\mathbb{R}^3$, find the equation of a plane that passes through the origin, and is parallel to both vectors $3\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ and $\mathbf{i} + 3\mathbf{j} - 2\mathbf{k}$.

3. Use the method or row operations to calulate the following determinant:

$$\begin{vmatrix} 0 & 8 & 3 & -4 \\ -1 & 2 & -2 & 5 \\ -2 & 8 & 4 & 3 \\ 0 & -4 & 2 & -3 \end{vmatrix}$$

4. What is the area of the paralellogram whose sides are the vectors $\mathbf{a} = 2\mathbf{i} + 6\mathbf{j}$, and $\mathbf{b} = \mathbf{i} + 3\mathbf{j}$?

5. What is the volume of the parallepiped whose sides are the vectors $\mathbf{a} = 3\mathbf{i} - \mathbf{j} + \mathbf{k}$, $\mathbf{b} = 2\mathbf{i} + 5\mathbf{j} + \mathbf{k}$, and $\mathbf{c} = 2\mathbf{i} + 6\mathbf{k}$?