Math 3160 - Practice Final

1. Let $\mathbf{v} = \langle 1, -4 \rangle$, $\mathbf{w} = \langle 2, 5 \rangle$

   (a) Graph the two vectors $\mathbf{v}$, $\mathbf{w}$ and $\mathbf{v} + \mathbf{w}$

   (b) Compute the angle between the two vectors $\mathbf{v}$, $\mathbf{w}$

   (c) Compute the area formed by the parallelogram formed by the two vectors $\mathbf{v}$ and $\mathbf{w}$.

2. Let $\mathbf{v} = \langle 1, -4, 3 \rangle$, $\mathbf{w} = \langle 1, 2, 5 \rangle$

   (a) Compute the angle between the two vectors $\mathbf{v}$, $\mathbf{w}$

   (b) Compute the area formed by the parallelogram formed by the two vectors $\mathbf{v}$ and $\mathbf{w}$.

   (c) Find a single vector simultaneously perpendicular to $\mathbf{v}$ and $\mathbf{w}$. of all vectors perpendicular to $\mathbf{v}$.

3. Let $\mathbf{v} = \langle 1, 1, 3 \rangle$, $\mathbf{w} = \langle 1, 1, 5 \rangle$.

   (a) Compute the angle between the two vectors $\mathbf{v}$, $\mathbf{w}$

   (b) Compute the area formed by the parallelogram formed by the two vectors $\mathbf{v}$ and $\mathbf{w}$.

4. Solve the system of linear equations three different ways.

$$\begin{array}{rrrr} x_1 & +x_2 & +x_3 & = 3 \\ & x_2 & +5x_3 & = -13 \\ -2x_1 & +3x_2 & +x_3 & = -5 \end{array}$$

   (a) row reduction

   (b) Using an inverse matrix

   (c) Cramer's Rule

5. Let $A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 2 & 1 \\ 0 & 2 & 0 \end{bmatrix}$

   Solve $A\mathbf{x} = \mathbf{x}$.

6. Write the definition of W is linear subspace of $\mathbb{R}^n$