Name _____

Fall 2025 Math 307 Sec 004 Schwitzerlett Quiz #1 September 11, 2024

Work each problem thoroughly showing all work.

---

1. Consider $\vec{u}$, $\vec{v}$ and $\vec{w}$ given below.

$$\vec{u} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \qquad \vec{v} = \begin{bmatrix} -3 \\ 1 \\ -2 \end{bmatrix} \qquad \vec{w} = \begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}$$

Find the following.

(a) $2\vec{u} + 2\vec{v} + \vec{w}$.

(b) These 3 vectors lie in the same plane. How do we know?

(c) Find $\vec{u} \cdot (\vec{v} + \vec{w})$.

2. Consider the equation $A\vec{x} = \vec{b}$ with A, $\vec{x}$ and $\vec{b}$ defined below. [Note: This problem can be completed using only what you learned in Chapter 1. You may solve it in the way we learned more recently, but that is not required.]

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -1 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & -1 & 1 \end{bmatrix} \qquad \vec{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \qquad \vec{b} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$$

(a) Solve the equation $A\vec{x} = \vec{b}$

(b) Write the solution as $\vec{x} = A^{-1}\vec{b}$.