Math 2550 - Test 1 - Spring 2024

Name:_____

Directions:

Show steps for full credit.
Also so I can give you partial credit if needed.

Score			
1		2	
3		4	
5		6	
Total			

1. [6 points] List 3 elements from the following set.

$$S = \{\ x\langle 2, 2, 0\rangle + y\langle -1, 1, 0\rangle \mid\ x, y \in \mathbb{R}\}$$

2. [9 points - 3 each] Let $\vec{a} = \langle 2, 1, -2 \rangle$, $\vec{b} = \langle 1, 0, 1 \rangle$, $\vec{c} = \langle 1, 1, 1, 1, 1 \rangle$, and $\vec{d} = \langle -1, 2, 3, 2, -1 \rangle$.

(a) Compute $-\vec{a} + 2\vec{b}$

(b) Compute the norm/length of $\vec{d}$

(c) Compute $\vec{a} \cdot \vec{b}$ and $\vec{c} \cdot \vec{d}$

3. [12 points - 3 each] Let

$$A = \begin{pmatrix} 1 & -1 \\ 2 & 2 \end{pmatrix} \quad B = \begin{pmatrix} 0 & 2 \\ 1 & 5 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 1 & -1 \\ 2 & 2 & 3 \end{pmatrix}$$

$$D = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} \quad E = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \quad F = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$$

Compute the following if possible. If not possible, explain why.
Show intermediate work so I can give you partial credit if needed.

(a) $2A + B$

(b) AB

(c) CD

(d) E^T and C^T

More space for problem 3...

4. [8 points] Solve the following system.

$$
\begin{array}{rcrcrcr}
x & + & y & + & z & = & 1 \\
2x & - & 3y & - & 3z & = & -3 \\
3x & + & 2y & + & 2z & = & 1
\end{array}
$$

You must use the Gaussian elimination / row reduction method we used in class to get credit.

5. [6 points] Solve the following system.

$$
\begin{array}{rcrcrcl}
x & - & 2y & & & - & 3w & = & 1 \\
& & & & z & + & 2w & = & 0 \\
& & & & & & w & = & 1
\end{array}
$$

6. [6 points] Let $\vec{u}$, $\vec{v}$, $\vec{w}$ be vectors in $\mathbb{R}^3$.

Prove that $\vec{u} \cdot (\vec{v} + \vec{w}) = \vec{u} \cdot \vec{v} + \vec{u} \cdot \vec{w}$