

# Math 2550-04 - Test 1 - Fall 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.

$$S = \{ c_1 \langle 1, 0 \rangle + c_2 \langle 1, 1 \rangle + c_3 \langle 2, 1 \rangle \mid c_1, c_2, c_3 \in \mathbb{R} \}$$

---

**2. [9 points - 3 each]** Let  $\vec{a} = \langle 3, 1, 0 \rangle$ ,  $\vec{b} = \langle 1, -1, 2 \rangle$ ,  $\vec{c} = \langle 0, 1, 2, -3, 4 \rangle$ , and  $\vec{d} = \langle 1, 0, -1, 0, 1 \rangle$ .

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

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

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

---

3. [12 points - 3 each] Let

$$A = \begin{pmatrix} 1 & 1 & -1 \\ 2 & 1 & 0 \end{pmatrix} \quad B = \begin{pmatrix} 2 & -1 \\ 1 & 1 \end{pmatrix} \quad C = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$
$$D = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix} \quad E = \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix} \quad F = \begin{pmatrix} -1 & -1 \\ 1 & -1 \end{pmatrix}$$

Compute the following if possible. If not possible, explain why.

- (a)  $2B + F$
- (b)  $BA$
- (c)  $AC$
- (d)  $D^T$

---

More space for problem 3...

---

---

4. [8 points] Solve the following system.

$$\begin{aligned}2x + y - 7z &= 6 \\x + 2y - 2z &= 0 \\x - 4y + z &= -6\end{aligned}$$

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

---

---

5. [6 points] Solve the following system.

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

---

---

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

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

---