Name: _____

MATH 108
Spring 2024
HW 15: Due 04/08

"Yeah. Yeah, I. . . I can see this. I mean, it's not for me, but people will like it. It's Starbucks. It's what American wants."

— Matthew MacDell, Big Mouth

Problem 1. (10pts) Define the following:

$$\mathbf{u} = \begin{pmatrix} 1 \\ 0 \\ -1 \\ 4 \end{pmatrix}, \qquad \mathbf{v} = \begin{pmatrix} 1 \\ -3 \\ 8 \\ 2 \end{pmatrix}, \qquad \mathbf{w} = \begin{pmatrix} 6 \\ -2 \\ -1 \\ 0 \end{pmatrix}$$

Showing all your work, compute the following:

(a) $-3\mathbf{w}$

(b) $\mathbf{v} - \mathbf{u}$

(c) $\mathbf{u} \cdot \mathbf{w}$

Problem 2. (10pts) Define the following:

$$A = \begin{pmatrix} -1 & 2 & 0 \\ 0 & 6 & -2 \end{pmatrix}, \qquad B = \begin{pmatrix} 6 & -3 & -1 \\ 1 & 1 & 0 \end{pmatrix}, \qquad C = \begin{pmatrix} 0 & 2 & -5 \\ 6 & 0 & 4 \end{pmatrix}$$

Showing all your work, compute the following:

(a) $3A$

(b) $B - A$

(c) CA^T

Problem 3. (10pts) Define the following:

$$A = \begin{pmatrix} 1 & -1 \\ 0 & 3 \\ -4 & 2 \\ 0 & 6 \end{pmatrix}, \qquad \mathbf{u} = \begin{pmatrix} 4 \\ -2 \\ 0 \\ 1 \end{pmatrix}$$

(a) Can one compute $A\mathbf{u}$? If so, compute it. If not, explain why.

(b) Can one compute $A^T\mathbf{u}$? If so, compute it. If not, explain why.