

Name:

OID:

Instructions: Be sure to show as much work as possible, and please make a sincere effort to express your answers clearly and neatly. Please write your answers on your own paper, then staple your pages together using this sheet as a cover sheet.

1. [3 pts] Consider the following matrices:

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 2 \\ 1 & 0 \\ 3 & -2 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 1 & 2 \\ -4 & 0 & 1 \\ 3 & 2 & 1 \end{bmatrix}$$
$$D = \begin{bmatrix} 2 & 4 \\ -3 & 1 \end{bmatrix} \quad E = \begin{bmatrix} 2 & 0 & 3 \\ -4 & 1 & 2 \\ 5 & 4 & 1 \end{bmatrix} \quad F = \begin{bmatrix} -1 & 2 \\ 0 & 4 \\ 3 & 5 \end{bmatrix}$$

If possible, compute: (a) $DA + B$ (b) EC (c) CE (d) $EB + F$

2. [12 pts] Let $L : \mathbf{R}^4 \rightarrow \mathbf{R}^3$ be the linear transformation defined by

$$L \left(\begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} \right) = \begin{bmatrix} x - z \\ y \\ w + z \end{bmatrix}.$$

- (a) Show directly that L is linear.
- (b) Find the standard matrix representation for L .
- (c) Describe the kernel of L .

3. [4 pts] Find an equation relating a , b , and c , so that the following linear system is consistent for any values of a , b , and c that satisfy that equation:

$$\begin{aligned} x &+ z = a \\ x + y + 2z &= b \\ 2x + y + 3z &= c \end{aligned}$$

4. [2 pts] Is it possible for a system of three equations in two unknowns to be consistent? If so, give an explicit example; if not, explain why not.