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Question # 4

Part # A
Solutions

Let $M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ 2×2

$$M^{-1} = \frac{1}{\det M} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} = \frac{1}{da - bc}$$

entries and d for
matrix M interchange
put the negative cross
inverse of b and c .

$$B = \begin{bmatrix} 3 & 4 \\ 2 & 3 \end{bmatrix}$$

$$= 9 - 8 = \boxed{1}$$

So determinant is 1.

$$C_2: \begin{vmatrix} 2 & 2 \\ 3 & 3 \end{vmatrix}$$

$$= 6 - 6$$

$$= 0$$

The determinant of matrix is 0

$$D_2: \begin{pmatrix} 101 & 101 & 101 \\ 102 & 103 & 102 \\ 104 & 101 & 105 \end{pmatrix}$$

$$= \begin{vmatrix} 1 & 1 & 1 \\ 6 & 7 & 6 \\ 2 & 1 & 9 \end{vmatrix}$$

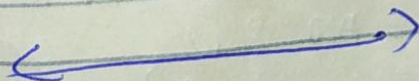
$$= \begin{vmatrix} 1 & 1 & 1 \\ 6 & 7 & 6 \\ 2 & 1 & 9 \end{vmatrix} - 1 \det \begin{bmatrix} 6 & 6 \\ 2 & 9 \end{bmatrix} + \det$$

$$\begin{bmatrix} 6 & 7 \\ 2 & 1 \end{bmatrix}$$

$$= 1 [63 - 6] - 1 [54 - 12] + 1 [14 - 6]$$

$$= 1 [57] - 1 [42] + 1 [10]$$

$$= 25 \text{ Answer}$$



Question # 3

part B

Polynomial of degree n
does not form a
vector space because
don't form set closed
under addition

For instance

$$x^n - x^n = 0$$

which is not of degree n

So don't get confused with
the set of polynomials
of equal degree less or
form a vector space
of dimension $n=1$ which
often work with $n=1$.

Question # 2

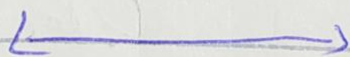
we want to prove $T(cu) = cT(u)$

$$\begin{aligned} T(cu) &= T(c[x_1 \ 2y_1 \ 2z_1]) \\ &= T([cx_1 \ cy_1 \ cz_1]) \\ &= [cx_1 + cy_1 \ cx_1 - cy_1 \ cz_1] \end{aligned}$$

and

$$\begin{aligned} cT(u) &= cT([x_1 \ y_1 \ z_1]) \\ &= c[x_1 + y_1 \ x_1 - y_1 \ z_1] \\ &= [c(x_1 + y_1) \ c(x_1 - y_1) \ cz_1] \\ &= [cx_1 + cy_1 \ cx_1 - cy_1 \ cz_1] \end{aligned}$$

$$\text{so } T(cu) = cT(u)$$



Question #1

sol

$$v_1 \begin{bmatrix} 1 \\ 6 \\ 7 \end{bmatrix}, v_2 \begin{bmatrix} 6 \\ 7 \\ 2 \end{bmatrix}, v_3 \begin{bmatrix} 7 \\ 2 \\ 9 \end{bmatrix}$$
 Need to solve

$$\left[\begin{array}{ccc|c} 1 & 6 & 7 & 0 \\ 6 & 7 & 2 & 0 \\ 7 & 2 & 9 & 0 \end{array} \right] R_2 + 1$$

$$\left[\begin{array}{ccc|c} 1 & 6 & 7 & 0 \\ 7 & 8 & 3 & 0 \\ 7 & 2 & 9 & 0 \end{array} \right] = R_2 - R_3$$

$$\left[\begin{array}{ccc|c} 1 & 9 & 7 & 0 \\ 0 & 6 & -6 & 0 \\ 7 & 2 & 9 & 0 \end{array} \right] R_3 - 7 \left[\begin{array}{ccc|c} 1 & 9 & 7 & 0 \\ 0 & 6 & -6 & 0 \\ 0 & -5 & 2 & 0 \end{array} \right] R_2 + R_3$$

$$\left[\begin{array}{ccc|c} 1 & 6 & 7 & 0 \\ 0 & 6 & -6 & 0 \\ 0 & -5 & 2 & 0 \end{array} \right] R_2 + R_3$$

$$\left[\begin{array}{ccc|c} 1 & 6 & 7 & 0 \\ 0 & 1 & -4 & 0 \\ 0 & -5 & 2 & 0 \end{array} \right] R_3 + 2$$

$$\left[\begin{array}{ccc|c} 1 & 6 & 7 & 0 \\ 0 & 1 & -4 & 0 \\ 0 & -3 & 4 & 0 \end{array} \right] R_2 + 3$$

$$\begin{bmatrix} 1 & 6 & 7 \\ 0 & 1 & -4 \\ 0 & -3 & 4 \end{bmatrix} R_3 + R_2$$

$$= \begin{bmatrix} 1 & 6 & 7 \\ 0 & 1 & -4 \\ 0 & -2 & 0 \end{bmatrix} R_3 \times 1/2$$

$$= \begin{bmatrix} 1 & 6 & 7 \\ 0 & 1 & -4 \\ 0 & 0 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 6 & 7 & 0 \\ 0 & 1 & -4 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

This show that matrix
is infinite this is
not lines independent.