NAME:
HABIB ID:

LINEAR ALGEBRA

SPRING 2024 – SECTIONS L2, L4, L6

QUIZ 5 (6th Feb 2024)

Max Marks: 10

Time: 10 minutes

Q.1 Compute the determinant of a matrix $\begin{bmatrix} x & y & z \\ 2 & 2 & 2 \\ z+y & z+x & y+x \end{bmatrix}$. [6 Marks]

Q2. Let $A\boldsymbol{x} = \boldsymbol{b}$ be the system of equation and A is a square matrix, what can we say about the solution if we know the Determinant of A is zero? and nonzero? [4 Marks]

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Q2. Let $A\boldsymbol{x} = \boldsymbol{b}$ be the system of equation and A is a square matrix, what can we say about the solution if we know the Determinant of A is zero? and nonzero? [4 Marks]

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Solution

$$\begin{vmatrix} x & y & z \\ 2 & 2 & 2 \\ y+z & x+z & x+y \end{vmatrix} \Rightarrow 2 \begin{vmatrix} x & y & z \\ 1 & 1 & 1 \\ y+z & x+z & x+y \end{vmatrix}$$ Taking 2 common from R_2

$$\Rightarrow 2 \begin{vmatrix} x & y & z \\ 1 & 1 & 1 \\ x+y+z & x+y+z & x+y+z \end{vmatrix} \quad R_3 = R_1 + R_3$$

$$\Rightarrow 2(x+y+z) \begin{vmatrix} x & y & z \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{vmatrix}$$ Taking $(x+y+z)$ from R_3

$$\Rightarrow 2(x+y+z)(0) = 0$$ (Two Rows are Identical then $\text{Det}(A) = 0$)

Q2 $\Rightarrow$ If $\text{Det}(A) = 0$, then $Ax = b$ has no-solution or Inf-many sol, and If $\text{Det}(A) \neq 0$, then unique sol.