Max. Marks: 10   Max. Time: 40 Min.

Question 1 [Marks: 1.5]:

Find the value/s of m so that $\det(A) = 10$, where $A = \begin{bmatrix} 2 & m & 1 \\ 0 & 1 & 1 \\ 4 & 3 & 1 \end{bmatrix}$.

Question 2 [Marks: 1.5]:

Let A and B be 3×3 matrices, where A is invertible and $B = \begin{bmatrix} 3 & 2 & 1 \\ 4 & 5 & 1 \\ 1 & 2 & 6 \end{bmatrix}$. If

$2A - BA + I = O$ then **find** A^{-1}.

Question 3 [Marks: 2]:

Find the reduced row equivalent form (RREF) of the matrix $A = \begin{bmatrix} 1 & -2 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 1 \end{bmatrix}$

and **then use** the RREF to **determine** the existence or non-existence of A^{-1}.

Question 4 [Marks: 1.5]:

Evaluate the determinant without expansion: $\begin{vmatrix} 1 & z & y+x \\ 1 & x & y+z \\ 1 & y & z+x \end{vmatrix}$.

Question 5 [Marks: 1.5]:

Find the values of a and b so that $x = 1,\ y = 0,\ z = -1$ is a solution
of the linear system:

$$ax - y + 3bz = -5$$
$$2ax + 5y - bz = 4.$$

Question 6 [Marks: 2]:

Find t**h**e values of λ such that the following linear system has a unique solution:

$$\begin{aligned} x &+ 2y + 3z &= 1 \\ x &+ y + z &= 1 \\ \lambda x &+ 3y + 4z &= 0. \end{aligned}$$

===...===

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SOLUTION KEY:

Question 1: $m = 9/2$

Question 2: $A^{-1} = \begin{bmatrix} 1 & 2 & 1 \\ 4 & 3 & 1 \\ 1 & 2 & 4 \end{bmatrix}$.

Question 3: The RREF of the matrix $A = I_3$; hence, A^{-1} exists.

Question 4: 0.

Question 5: $a = 1, \; b = 2$.

Question 6: $\lambda \in \mathbb{R} - \{2\}$.