Row operations and geometric interpretation of solution sets

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Apply $R_2 \leftarrow R_2 - 3R_1$ to [1,2,-1|4] and [3,7,-2|13]. [2 marks]

Subtract [3,6,-3|12] entry by entry.

The new equation is y+z=1.

Answer: [0,1,1|1]

2. Interpret rows [1,0,0|2], [0,1,0|-1], [0,0,1|3]. [2 marks]

Every variable has its own pivot.

Read the augmented constants.

Answer: Unique solution (2,-1,3).

3. Interpret rows [1,2,0|5], [0,0,1|1], [0,0,0|0]. [2 marks]

Choose y=t.

Then x=5-2t and z=1.

Answer: Line $(5-2t, t, 1)$.

4. Interpret a consistent three-variable system with one pivot. [2 marks]

One independent equation restricts three variables.

Two independent directions remain free.

Answer: A plane with two free parameters.

5. Is multiplying a row by zero an equivalence operation? [2 marks]

It destroys the row's constraint.

It cannot be reversed.

Answer: No.

6. Check (2,1,0) in x+y+z=3, 2x-y+z=3, x-y-z=1. [2 marks]

The three left sides are 3, 3 and 1.

Each agrees with its original constant.

Answer: It is a correct solution.