

SIIT MAS210 Quiz 1

Circle the correct answer (more than one circle per question, or unclear marks invalidate your answer) This exam requires a minimal amount of computations, and can be solved in 10 minutes.

1. Given the system

$$\begin{aligned} x_1 + x_2 + 2x_3 + x_4 &= 1 \\ -x_1 \quad \quad \quad + x_4 &= 2 \\ x_2 + 2x_3 + 2x_4 &= 3 \\ x_1 + 2x_2 + 4x_3 + 3x_4 &= 4 \end{aligned}$$

- (a) It has unique solution $x_1 = -1, x_2 = -1, x_3 = 1, x_4 = 1$.
 (b) It is incompatible
 (c) It has infinitely many solutions, with solution set $x_1 = 1+t, x_2 = -1-t, x_3 = 4+t, x_4 = t$.
 (d) It has infinitely many solutions, with solution set $x_1 = -2+s, x_2 = 3-2t-2s, x_3 = t, x_4 = s$.
 (e) none of the above
2. Let A be the coefficient matrix of the system in Problem 1. Let $|A|$ be the determinant of A
 (a) $|A| = 1$,
 (b) $|A|$ does not exist
 (c) $|A|$ has infinitely many values
 (d) $|A| = 0$
 (e) none of the above
3. Let A be the coefficient matrix of the system in Problem 1. Then
 (a) rank A = 0 (b) rank A = 2 (c) rank A = 3 (d) rank A = 4 (e) rank A = 1
4. Let A be the coefficient matrix of the system in Problem 1. Then
 (a) A^{-1} does not exist.
 (b) $A^{-1} = 0$
 (c) $A^{-1} = 1/|A|$
 (d) $A^{-1} = \det A^{-1}$
 (e) A^{-1} has infinitely many solutions
5. The vectors $\mathbf{v}_1 = (1, 1, 0, 0)$, $\mathbf{v}_2 = (1, -1, 1, 1)$, $\mathbf{v}_3 = (0, 2, -1, -1)$, $\mathbf{v}_4 = (3, 1, 1, 1)$.
 (a) are linearly independent
 (b) are linearly dependent
 (c) it does not exist a nontrivial linear combination of them equal to zero.
 (d) cannot be determined because of insufficient data
 (e) none of the above
6. Let A be the (4x4) matrix whose columns are the vectors $\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3, \mathbf{v}_4$ of Problem 5
 (a) The homogeneous system $\mathbf{Ax} = \mathbf{0}$ has only one solution, the trivial solution
 (b) $|A| = 1$
 (c) the row columns of A are linearly independent
 (d) the row columns of A are linearly dependent
 (e) none of the above

ANSWERS

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|------------|-----|-----|-----|-----|-----|
| Problem 1: | (a) | (b) | (c) | (d) | (e) |
| Problem 2: | (a) | (b) | (c) | (d) | (e) |
| Problem 3: | (a) | (b) | (c) | (d) | (e) |
| Problem 4: | (a) | (b) | (c) | (d) | (e) |
| Problem 5: | (a) | (b) | (c) | (d) | (e) |
| Problem 6: | (a) | (b) | (c) | (d) | (e) |