



King Saud University

Department of Mathematics

First semester 1446H

3/10/2024 – 30/3/1446H. (8 -10 a.m.)

104 Math

1st Midterm Exam

Duration: 2 hours

Name:

Sequence Number:

Section:

Question	1	2	3	4	5
Answer					

I) Choose the correct answer and put the answer in the above table: (5 points)

1. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 5 & 7 & 2 \\ 0 & 0 & 0 \end{bmatrix}$, then $|A|$ equals

- (a) 7 (b) 5 (c) 0 (d) None of the previous
-

2. If $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = 2$, then $\begin{vmatrix} 3a & 3b \\ 3c & 3d \end{vmatrix}$ equals

- (a) 6 (b) 0 (c) 18 (d) None of the previous
-

3. If $A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 2 & 0 & -2 \end{bmatrix}$, then A is

- (a) Upper triangular (b) lower triangular
(c) diagonal (d) None of the previous

4. If $A = \begin{bmatrix} 1 & -7 & 5 \\ 0 & 1 & 5 \\ 0 & 0 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 & 0 \\ -1 & -1 & 0 \\ 5 & 4 & -1 \end{bmatrix}$, then

$\det(A) + \det(B)$ equals

- (a) 0 (b) 1 (c) 2 (d) None of the previous
-

5. If B is a 10×7 matrix and C is a 4×7 matrix, then CB^T is of size

- (a) 10×4 (b) 4×10 (c) 7×7 (d) None of the previous

II) If $A = \begin{bmatrix} 1 & 3 & 1 \\ 0 & 2 & -1 \\ -3 & 0 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 6 & 2 \\ 1 & -1 & 0 \\ -3 & 1 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ 1 & 2 \end{bmatrix}$,
compute (if possible) with reasons: **(5 points)**

- (a) $A + C$
- (b) AB
- (c) BC
- (d) CB
- (e) C^T
- (f) $\det(A)$

III) (A) For the hyperbola

(5 points)

$$4y^2 - x^2 - 24y - 4x + 16 = 0$$

- (i) Find the coordinates of the center P of the hyperbola

- (ii) Find the vertices of the hyperbola

- (iii) Find the foci of the hyperbola

- (iv) Find the equations of the asymptotes

- (v) Sketch the graph of the given hyperbola.

(B) Find the equation of the ellipse with foci at (1,-2), (1,6), and the length of its minor axis equals 8. **(2 points)**

IV) (A) Use Cramer's method to find y (only y) in the linear system:
(4 points)

$$x + y + z = 12$$

$$x - y = 2$$

$$x - z = 4$$

(B) Use the Gauss-Jordan method to solve the system:

(4 points)

$$x_1 + x_2 + x_3 = 1$$

$$-x_1 + x_2 + x_3 = 3$$

$$2x_1 + x_2 - 3x_3 = 5$$