



## EMAT102L

### Class Test 1 (Group 5)

Total marks: 10

Time: 20 minutes

Each question carries 2 marks.

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1. Let  $A = \begin{pmatrix} 1 & 2 \\ -3 & -4 \end{pmatrix}$ ,  $B = \begin{pmatrix} 1 & 2 \\ 7 & 10 \end{pmatrix}$ . Let  $E_1$  and  $E_2$  be two elementary matrices such that  $B = E_2 \cdot E_1 \cdot A$ . Then find the value of  $\text{trace}(E_1 + E_2)$ .
- (a) 2      (b) 3      (c) 4      (d) 1
2. Consider the following system of linear equations:

$$x + ay = 4,$$

$$ax + 9y = b.$$

For which values of  $a$  does the system have a unique solution?

- (a)  $a \in \mathbb{R}, a \neq \pm 3$       (b)  $a \in \mathbb{R}$       (c)  $(-1, 1)$       (d)  $a \in \mathbb{R}, a \neq 3$
3. Which of the following matrices are in row reduced echelon form (RREF)

$$A = \begin{bmatrix} 1 & 0 & 0 & \sqrt{2} \\ 0 & 1 & 0 & \sqrt{3} \\ 0 & 0 & 1 & \sqrt{5} \\ 0 & 0 & 0 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 9 & 0 & 0 & 7 \ln 2 \\ 0 & 1 & 0 & 3 \ln 3 \\ 0 & 0 & 1 & 5 \ln 5 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

- (a) only  $A$
- (b)  $A$  and  $C$
- (c)  $A$  and  $B$
- (d) only  $C$

4. Rank of the matrix  $\begin{bmatrix} 1 & 1 & -2 & -2 \\ -3 & -3 & 4 & 4 \\ 0 & 0 & -5 & -5 \end{bmatrix}$  is

(a) 3

(b) 2

(c) 1

(d) 4

5. Consider the matrix  $A = \begin{bmatrix} 2x+1 & 5x+4 \\ 1 & x+2 \end{bmatrix}$  Then the values of  $x \in \mathbb{R}$  for which  $A$  is invertible

(a)  $x \in \mathbb{R}$

(b)  $x \in (-\infty, -1) \cup (1, \infty)$

(c)  $x \in \mathbb{R}, x > 1$

(d)  $x \in \mathbb{R}, x \neq \pm 1$

Note: In question number 5, there was some typographical error. So, everyone will get grace mark for this.