NAME:
HABIB ID:

LINEAR ALGEBRA

SPRING 2024 – SECTIONS L1, L3, L5

QUIZ 6 (15th Feb, 2024)

Max Marks: 10

Time: 8 minutes

Q. Consider the matrix A given below. Find all values of θ for which A is nonsingular. Then find A^{-1}.

$$A = \begin{bmatrix} \cos\ \theta & \sin\ \theta & 0 \\ -\sin\ \theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

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LINEAR ALGEBRA

SPRING 2024 – SECTIONS L2, L4, L6

QUIZ 6 (15th Feb, 2024)

Max Marks: 10

Time: 7 minutes

Q. Let E be an n x n elementary matrix that results from interchanging two rows of I_n. If B is an n x n matrix, then prove that $\det(EB) = \det(E)\det(B)$.

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QUIZ 6 SOLUTIONS
L1, L3, L5 (2:07 – 2:15)
Thur 15th Feb

Solution: Theorem, If A is an invertible matrix, then

$$A^{-1} = \frac{1}{\det(A)} \operatorname{adj}(A)$$

$$\det(A) = 1 \begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix} = (\cos\theta^2 + \sin\theta^2) = 1$$

Therefore, A is invertible/nonsingular for all real values of θ

$$\operatorname{adj}(A) = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{\det(A)} \operatorname{adj}(A) = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

QUIZ 6 SOLUTIONS

L2, L4, L6 (4:38 – 4:45)
Thur, 15th Feb