

Quiz I (UTR) , MTH 221, Fall 2015

Ayman Badawi

QUESTION 1. Find the solution set for:

$$x_2 + 3x_3 + x_4 + 2x_5 = 4$$

$$x_1 - 2x_2 - 6x_3 + 2x_4 = 2$$

$$2x_1 + 3x_2 + 9x_3 + 12x_4 + x_5 = 10$$

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Quiz 2 MTH 221, Fall 2015

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QUESTION 1. Let $A = \begin{bmatrix} 1 & 2 & 6 & 1 \\ -2 & 1 & 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & 5 \\ 6 & -5 & -1 \\ 2 & 2 & 2 \\ -3 & 0 & 0 \end{bmatrix}$. Find the third column of AB . (use the concept of linear combination of columns)

QUESTION 2. Find the solution set for:

$$\begin{aligned}x_1^3 + x_2^2 + x_3^3 &= 6 \\2x_1^3 + 3x_2^2 + 2x_3^3 &= 16 \\-x_1^3 - x_2^2 &= -5\end{aligned}$$

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Quiz III MTH 221, Fall 2015

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QUESTION 1. Let $A = \begin{bmatrix} 2 & 2 & 2 \\ 6 & -4 & -4 \\ 1 & 2 & -2 \end{bmatrix}$. Find a symmetric matrix, say B , and a skew-symmetric matrix, say D , such that $A = B + D$.

QUESTION 2. Let $A = \begin{bmatrix} 0 & 0 & 1 & 2 \\ 0 & 0 & -1 & -1 \\ 0 & 1 & -2 & -4 \\ 1 & 0 & -1 & -2 \end{bmatrix}$. Is A invertible (nonsingular)? if yes, then find A^{-1} .

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Quiz IV MTH 221, Fall 2015

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QUESTION 1. Let A be a 4×3 matrix such that $A \xrightarrow{-4R_3} A_1 \xrightarrow{R_2 \leftrightarrow R_3} A_2 \xrightarrow{-3R_2 + R_3 \rightarrow R_3} A_4$

(i) Find elementary matrices E_1, E_2 such that $E_1 E_2 A_1 = A_4$

(ii) Find elementary matrices F_1, F_2, F_3 such that $F_1 F_2 F_3 A_4 = A$

QUESTION 2. Let $A = \begin{bmatrix} 1 & 1 & 1 & 2 \\ -1 & 2 & 4 & 12 \\ 0 & -3 & -5 & -4 \\ 0 & -3 & 10 & 10 \end{bmatrix}$. Find $\det(A)$.

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Quiz V MTH 221, Fall 2015

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QUESTION 1. (a) Find a nonsingular matrix A , 2×2 , such that $A^{-1} \begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix} - 2A^{-1} = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$.

(b) Let $A = \begin{bmatrix} 4 & 2 & 2 \\ -4 & 1 & 4 \\ -4 & -2 & 6 \end{bmatrix}$. Consider the system of L.E. $AX = \begin{bmatrix} 2 \\ 4 \\ 1 \end{bmatrix}$. What is the value of x_3 ?

c) Assume that A as in (b) is invertible. Find the (1, 3)-entry of A^{-1} .

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Quiz 6 MTH 221, Fall 2015

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QUESTION 1. a) Let $F =$ the interval $(-4, \infty)$ (all real numbers > -4). Convince me that F is not a vector space.

b) Let $F = \{(x_1, 0, 1, 0) \mid x_1, x_2 \in R\}$. Convince me that F is not a subspace of R^4 .

c) Let $M = \{A \in R^{2 \times 2} \mid \det(A) = 1\}$. Convince me that M is not a subspace of $R^{2 \times 2}$

c) Let $F = \{f(x) \in P_{77} \mid f(4) = 0\}$. Convince me that F is a subspace of P_2 .

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Quiz 8 MTH 221, Fall 2015

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QUESTION 1. Let $F = \{a + bx + bx^2 + cx^3 \in P_4 \mid a, b, c, d \in R, a - 2b - d = 0, \text{ and } c - 3b - d = 0\}$.

- (i) Show that F is a subspace of P_4 .
- (ii) Find a basis for F and write F as a span.

QUESTION 2. Let $A = \begin{bmatrix} 1 & -1 & 2 & 8 & -2 \\ -1 & 1 & -2 & -8 & 2 \\ -1 & 2 & -2 & 2 & 4 \end{bmatrix}$.

- a) Find a basis for $\text{Row}(A)$, and a basis for $\text{Col}(A)$.
- c) Write $N(A)$ as a span of some basis. What is the $\dim(N(A))$?

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