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# Quiz one: MTH 221@12, Spring 2017

Ayman Badawi

**QUESTION 1.** Find the solution set to the following system

$$x_3 - x_4 + 2x_5 = 2$$

$$x_1 - x_2 + 3x_4 = 6$$

$$-2x_1 + 2x_2 - x_3 - 4x_4 - x_5 = 4$$

**QUESTION 2.** Consider a system of this form

$$x_1 + 2x_2 + x_3 = a$$

$$-x_1 + bx_2 - x_3 = 1$$

$$3x_1 + 6x_2 + 4x_3 = 20$$

i)For what values of $a, b$ will the system be consistent?

ii) For what values of $a, b$ will the system have unique solution ?

iii) If the system has infinitely many solutions, what is the solution set of the system?

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# Quiz one: MTH 221@2, Spring 2017

Ayman Badawi

**QUESTION 1.** Find the solution set to the following system

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

$$x_1 - x_2 + x_3 - 2x_4 = 4$$

$$-2x_1 + 2x_2 + 3x_3 - 6x_4 = 12$$

**QUESTION 2.** Consider a system of this form

$$x_1 - 6x_2 + x_3 = a$$
$$-2x_1 + bx_2 - 2x_3 = 8$$
$$-x_1 + 6x_2 + 4x_3 = 20$$

i)For what values of $a, b$ will the system be consistent?

ii) For what values of $a, b$ will the system have unique solution ?

iii) If the system has infinitely many solutions, what is the solution set of the system?

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# Quiz II @2pm: MTH 221, Spring 2017

Ayman Badawi

**QUESTION 1.** Let $A = \begin{bmatrix} 4 & -1 & 4 \\ -2 & 6 & -1 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 1 \\ -1 & 4 \\ -3 & 2 \end{bmatrix}$.

i)Use the method of linear combination of columns to find the matrix $AB$.

ii) Use the method of linear combination to find $BA$.

**QUESTION 2.** Given $F = \{(5x_3 + 2x_4, -7x_4, x_3, x_4) | x_3, x_4 \in R\}$ is a solution to a homogeneous system of L.Eqs. Write $F$ as span

**QUESTION 3.** Given $Q_1 = (2, -1, 1, 4)$, $Q_2 = (-2, 1, 0, 6)$, and $Q_3 = (-2, 1, 1, 16)$. Are $Q_1, Q_2, Q_3$ independent?

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# Quiz III @2pm: MTH 221, Spring 2017

Ayman Badawi

**QUESTION 1.** Let $A = \begin{bmatrix} 0 & 6 \\ 4 & 2 \end{bmatrix}$. Write $A$ as a sum of a symmetric matrix and a skew-symmetric matrix.

**QUESTION 2.** Let $A = \begin{bmatrix} 0 & 1 & -4 \\ 1 & -2 & 8 \\ -4 & 0 & 1 \end{bmatrix}$

(i) Find $A^{-1}$

(ii) Find the solution set to the system of L. E. : $AX = \begin{bmatrix} 4 \\ 0 \\ -2 \end{bmatrix}$.

(iii) Find the solution set to the system of L. E. : $A^T X = \begin{bmatrix} -2 \\ 2 \\ 0 \end{bmatrix}$.

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# Quiz IV @14: MTH 221, Spring 2017

Ayman Badawi

**QUESTION 1.** Let $A = \begin{bmatrix} 4 & 2 & 1 \\ -2 & 1 & 4 \\ 1 & 2 & 0 \end{bmatrix}$. Find $|A|$ using the definition of determinant.

**QUESTION 2.** Given $A$ is a $4 \times 4$ matrix such that $A \xrightarrow{\underbrace{3R_3}} A_1 \xrightarrow{\underbrace{-3R_2 + R_4 \to R_4}} A_2 = \begin{bmatrix} 1 & 2 & 1 & 1 \\ -2 & -2 & 1 & 1 \\ -1 & -2 & -1 & 1 \\ -1 & -2 & 2 & -1 \end{bmatrix}$

a) Find $|A|$ (hint: STARE really well.. you should not do too many calculations!).

b) If $A^{-1}$ exists, find $|3A^{-1}|$

c) Find $|0.5A^T|$.

d) Find $|A_1 A_2|$

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# Quiz V @2: MTH 221, Spring 2017

Ayman Badawi

**QUESTION 1.** a) Let $A = \begin{bmatrix} 1 & 5 & -2 \\ -4 & 1 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 & 4 \\ -1 & 2 & 6 \\ 0 & 8 & 4 \end{bmatrix}$. Let $AB = C$. Use dot product to find

i) $c_{2,3}$

ii) $c_{2,1}$.

iii)$c_{1,3}$

b) Let $A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ -2 & 4 & 2 \end{bmatrix}$

i) Find all eigenvalues of $A$.

ii) For each eigenvalue $\alpha$ of $A$ find $E_\alpha$.

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# Quiz V @2: MTH 221, Spring 2017

Ayman Badawi

**QUESTION 1.** a) Find a matrix $A$, $2 \times 2$, such that $\begin{bmatrix} -2 & 1 \\ 0 & -2 \end{bmatrix} A + 3A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$

b) Let $A = \begin{bmatrix} 2 & 4 & -2 \\ 0 & 4 & 2 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 & 4 \\ -1 & 2 & 6 \\ 0 & 8 & 4 \end{bmatrix}$. Let $AB = C$. Use dot product to find

i) $c_{2,3}$

ii) $c_{2,1}$.

iii)$c_{1,3}$

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# Quiz VII @2: MTH 221, Spring 2017

Ayman Badawi

**QUESTION 1.** (i) Convince me that $A = \{(a, b, a-2) \mid a, b \in R\}$ is not a subspace of $R^3$.

(ii) Convince me that $B = \{A \in R^{2\times 2} |\ |A| = 0\}$ is not a subspace of $R^{2\times 2}$

(iii) Convince me that $\{-x^2 + ax + b | a, b \in R\}$ is not a subspace of $R^3$.

(iv) Convince me that $B = \{(a+2b)x^3 + (-2a-4b)x^2 + cx - 5c \mid a, b, c \in R\}$ is a subspace of $P_4$.

Find the independent-number of $B$ and

Find a basis for $B$

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