姓名 Name : _____ 學號 Student ID # : _____
Quiz 1   MATH 103 / GEAI 1215: Linear Algebra I

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & 7 & 3 \\ 2 & -1 & 11 & 6 \\ -5 & 1 & -23 & -15 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 1$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

NullBasis 1   Indicating your answer by **underlining it** or **circling it**.   check code
Compute the **check code** and fill it into the **box on the right**.

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & 5 & -5 & -5 \\ 4 & 20 & -20 & -19 \\ 11 & 55 & -55 & -53 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 1$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -5 & -5 & -6 \\ -5 & 26 & 26 & 31 \\ 19 & -98 & -98 & -117 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 1$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

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Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & 0 & 4 \\ 5 & -4 & -4 & 15 \\ 18 & -15 & -12 & 57 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 1$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

NullBasis 4   Indicating your answer by **underlining it** or **circling it**.   check code

Compute the **check code** and fill it into the **box on the right**.

Consider the equation $\mathbf{A}\mathbf{x} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & 3 & 3 & 18 \\ 5 & 15 & 16 & 95 \\ -5 & -15 & -15 & -90 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 2$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

NullBasis 5   Indicating your answer by **underlining it** or **circling it**.   check code
Compute the **check code** and fill it into the **box on the right**.

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & 4 & 0 & -3 \\ -5 & -20 & 0 & 16 \\ 2 & 8 & 0 & -6 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 2$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & 1 & 2 \\ -5 & 6 & -10 & -10 \\ 25 & -30 & 50 & 50 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 1$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

NullBasis 7

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

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Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -3 & -1 & 11 \\ 5 & -14 & -3 & 50 \\ 7 & -19 & -3 & 67 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 1$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

Indicating your answer by **underlining it** or **circling it**.
Compute the **check code** and fill it into the **box on the right**.

check code

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & -5 & -24 \\ 0 & 0 & 1 & 4 \\ 4 & -4 & -25 & -116 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 2$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

Consider the equation $\mathbf{Ax} = \mathbf{0}$, where

$$\mathbf{A} = \begin{bmatrix} 1 & -1 & 3 & -8 \\ 4 & -4 & 13 & -35 \\ -14 & 14 & -46 & 124 \end{bmatrix}, \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}, \text{ and } \mathbf{0} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}.$$

Compute the reduced echelon form $\mathbf{R}$ of $\mathbf{A}$ to get the free variables. Let $k = 2$. Find a solution $\mathbf{x} = \boldsymbol{\beta}_k$ by setting the k-th free variable as 1 while the other free variables as 0.

Check code = (sum of all entries of $\boldsymbol{\beta}_k$) mod 10

Solution.

Indicating your answer by **underlining it** or **circling it**.   check code
Compute the **check code** and fill it into the **box on the right**.