Hand your completed quiz in before the due date. Do not forget to write down your name and student ID number. Marks will be awarded for this quiz based on the clarity of your answers. The marker will pay close attention to the logic of your answers. Please show all your working.

Q1. Solve the following systems of linear equations using Gaussian elimination.

(a) \[
\begin{align*}
 & x - y + 2z = 0 \\
 & 2x - 4y + 5z = -5 \\
 & 2y - 3z = 5
\end{align*}
\]

(b) \[
\begin{align*}
 & 2x - 3y + z = 3 \\
 & x + 2y + 2z = -1 \\
 & 4x + y + 5z = 4
\end{align*}
\]

Q2. Solve the following systems of linear equations applying elementary row operations on the corresponding augmented matrices.

(a) \[
\begin{align*}
 & x + 3y - z = 0 \\
 & 3x + 4y - 2z = -1 \\
 & -x + 2y = 1
\end{align*}
\]

(b) \[
\begin{align*}
 & x + y + 2z = 6 \\
 & 2x + 5z = 12 \\
 & x + 2y + 3z = 9
\end{align*}
\]

(c) \[
\begin{align*}
 & x - 3y + z = 4 \\
 & 4x - y + 15z = 5
\end{align*}
\]

Q3. Let \( A = \begin{bmatrix} 2 & 3 \\ 2 & 4 \end{bmatrix} \), \( B = \begin{bmatrix} 2 & 4 \\ -1 & 1 \\ 3 & 0 \end{bmatrix} \), \( C = \begin{bmatrix} 1 & 0 & 4 \\ -1 & 1 & 2 \\ 0 & 1 & 3 \end{bmatrix} \).

Compute the following or explain why it is impossible to compute.

(a) \( A + B \).

(b) \( AB \).

(c) \( BA - 3B \).

(d) \( CBA \).

(e) \( A^{-1} \).

(f) \( C^{-1} \).

Q4.

(a) Write a matrix equation \((Ax = b)\) of the following system.

\[
\begin{align*}
 & 4x - 3y = 10 \\
 & 3x - 2y = 30
\end{align*}
\]
(b) Compute $A^{-1}$ and solve the system using $A^{-1}$.

Q5. Let $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$. Find $A^2$, $A^3$, and $A^{2018}$.

Q6. Let $A = \begin{bmatrix} -5 & 2 \\ -12 & 5 \end{bmatrix}$. It is known that $A = PDP^{-1}$ where $P = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $D = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$. Find $A^{2018}$. 