Name: **Lab# 05** **Your ID #:**

The Systems of Linear Equations

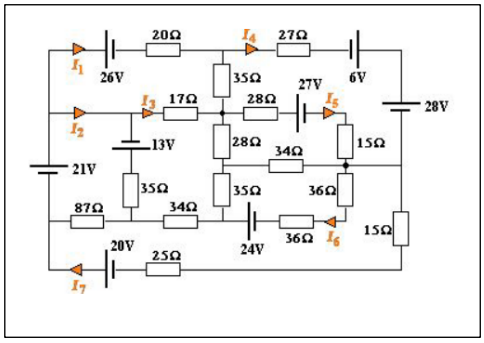
Please answer the below questions:

Q1 (*5pts*): **Gaussian Elimination Method:** Write a program that solves a system of linear equations using the Gaussian Elimination method. Test your program on a system of equations with known solutions and compare your results with the analytical solution.

Q2 (*5pts*): **Matrix Inversion Method:** Write a program that solves a system of linear equations by inverting the coefficient matrix. Test your program on the system of equations in **Q1** and compare your results with Gaussian Elimination method.

Q3 (*5pts*): **Applications in Physics**: Use the above methods to solve a system of linear equations that arises in a physics problem. Here is a complex circuit with **7** unknown currents labeled $\mathbf{I_1}$ through $\mathbf{I_7}$.

$$
\begin{aligned}
-26 &= 72I1 - 17I3 - 35I4 \\
34 &= 122I2 - 35I3 - 87I7 \\
-4 &= 233I7 - 87I2 - 34I3 - 72I6 \\
-13 &= 149I3 - 17I1 - 35I2 - 28I5 - 35I6 - 34I7 \\
-27 &= 105I5 - 28I3 - 43I4 - 34I6 \\
24 &= 141I6 - 35I3 - 34I5 - 72I7 \\
5 &= 105I4 - 35I1 - 43I5
\end{aligned}
$$



Q3 (*5pts*): **Accuracy and Performance:** Compare the accuracy and performance of the different methods on a large system of linear equations. For example, you could compare the time it takes for each method to solve a system of 100 equations, and the accuracy of the solutions obtained by each method.