1. Solve the system \(2u + v = 8, \quad 4u - \frac{3}{2}v = 9\) using each of the four methods presented in class.

2. Find a polynomial of degree two whose graph goes through the points:
   (a) \((1, -1), (2, 3),\) and \((3, 13)\);
   (b) \((1, s_1), (2, s_2),\) and \((3, s_3),\) where \(s_1, s_2, s_3 \in \mathbb{R}\).

3. For the following systems of equations, do the following: Rewrite the systems as an equation \(Ax = b\), do Gaussian Elimination and write down the elementary matrices needed, find the LDU Decomposition of \(A\), find \(c\) such that \(Lc = b\) and finally find \(x\) such that \(DUx = c\):
   (a) \(2u + 4v = 3, 3u + 7v = 2\);
   (b) \(3u + 5v + 3w = 25, 7u + 9v + 19w = 65, -4u + 5v + 11w = 5\);
   (c) \(u + 2v + 3w = 39, u + 3v + 2w = 34, 3u + 2v + w = 26\);
   (d) \(u + 3v + 5w = 1, 3u + 12v + 18w = 1, 5u + 18v + 30w = 1\);
   (e) \(\alpha u + \beta v = 1, \beta u + \gamma v = 1\) (where \(\alpha, \beta, \gamma \in \mathbb{R}, \alpha(\alpha\gamma - \beta^2) \neq 0\)).

4. Let \(A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 3 & 0 & 1 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{bmatrix}\).
   (a) Compute \(AC, CB, A CB, A^2, B^2, CC^T\).
   (b) Find \(A^n\) and \(B^n\) for all \(n \in \mathbb{N}\) (prove your claim using the Principle of Mathematical Induction).
   (c) Show that \(A\) is not invertible. Also show that \(B\) is invertible and find \(B^{-1}\).

5. Prove Proposition 1.1(b), i.e., matrix operations are distributive.

6. Use the Gauss-Jordan method to find the inverses of:
   \[
   \begin{bmatrix}
   1 & 0 & 0 \\
   1 & 1 & 1 \\
   0 & 0 & 1
   \end{bmatrix};
   \]
   \[
   \begin{bmatrix}
   2 & -1 & 0 \\
   -1 & 2 & -1 \\
   0 & -1 & 2
   \end{bmatrix};
   \]
   \[
   \begin{bmatrix}
   0 & 0 & 1 \\
   0 & 1 & 2 \\
   1 & 2 & 3
   \end{bmatrix}.
   \]