

# 1 Assignment 2 - Solving Sets of Equations

1. Solve the following linear system by using *Gauss-Jordan Method*;

$$\begin{aligned}x_1 + 2x_2 + x_3 + 4x_4 &= 13 \\2x_1 + 4x_3 + 3x_4 &= 28 \\4x_1 + 2x_2 + 2x_3 + x_4 &= 20 \\-3x_1 + x_2 + 3x_3 + 2x_4 &= 6\end{aligned}$$

**Hint:** Modify the MATLAB code for *Upper Triangularization Followed by Back Substitution*.

2. Modify the MATLAB code for *PA = LU:Factorization with Pivoting* so that  $L, U$  and  $P$  are output, then by using solve the following linear system;

$$\begin{aligned}x_1 + 2x_2 + 4x_3 + x_4 &= 21 \\2x_1 + 8x_2 + 6x_3 + 4x_4 &= 52 \\3x_1 + 10x_2 + 8x_3 + 8x_4 &= 79 \\4x_1 + 12x_2 + 10x_3 + 6x_4 &= 82\end{aligned}$$

**Hints:** You can check your results by using MATLAB as;

```
>> [L,U,P]=lu(A)
>> inv(P)*L*U
```

3. Solve the following linear system by using *Gauss-Seidel Iteration*;

$$\begin{aligned}4x - y + z &= 7 \\4x - 8y + z &= -21 \\-2x + y + 5z &= 15\end{aligned}$$

- Start by  $P_0 = (1, 2, 2)$ .
- Tabulate the iteration. Compare with the *Jacobi Iteration*.

**Hint:** Modify the MATLAB code for *Jacobi Iteration*.