

## LE 230 Homework : System of Linear Equations

**Please show all details of your solutions.**

3-1 Solve the following linear systems using Gauss elimination, Gauss elimination with partial pivoting, Gauss-Jordan elimination and LU decomposition “manually”:

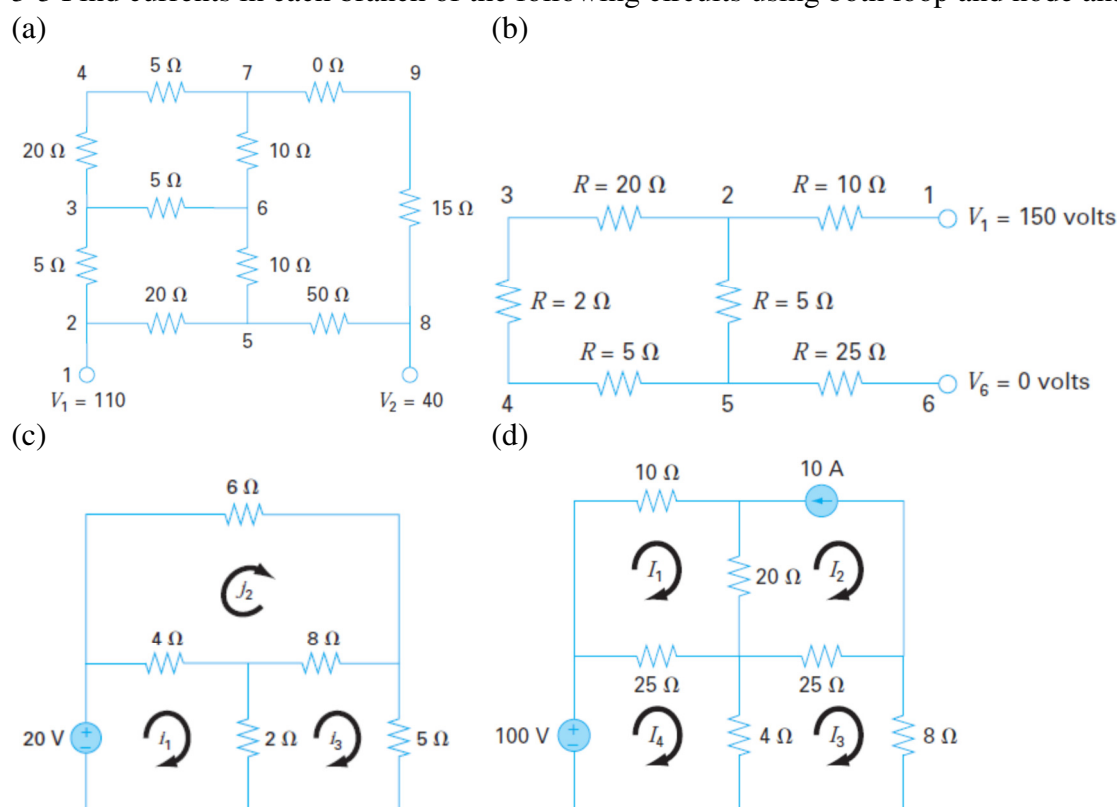
(a)  $10x_1 + 2x_2 - x_3 = 27$ ;  $-3x_1 - 6x_2 + 2x_3 = -61.5$ ;  $x_1 + x_2 + 5x_3 = -21.5$

(b)  $4x_1 + x_2 - x_3 = -2$ ;  $5x_1 + x_2 + 2x_3 = 4$ ;  $6x_1 + x_2 + x_3 = 6$

(c)  $2x_1 - 6x_2 - x_3 = -38$ ;  $-3x_1 - x_2 + 7x_3 = -34$ ;  $-8x_1 + x_2 - 2x_3 = -20$

3-2 Write MATLAB codes for Gauss elimination and Gauss-Jordan method, then use them to solve the systems in 3-1.

3-3 Find currents in each branch of the following circuits using both loop and node analyses:



3-4 An electrical engineer supervises the production of three types of electrical components. Three kinds of material—metal, plastic, and rubber—are required for production. The amounts needed to produce each component are

| Component | Metal<br>g/component | Plastic<br>g/component | Rubber<br>g/component |
|-----------|----------------------|------------------------|-----------------------|
| 1         | 15                   | 0.25                   | 1.0                   |
| 2         | 17                   | 0.33                   | 1.2                   |
| 3         | 19                   | 0.42                   | 1.6                   |

If totals of 2.12, 0.0434, and 0.164 kg of metal, plastic, and rubber, respectively, are available each day, how many components can be produced per day?