KIX 1001: ENGINEERING MATHEMATICS 1

Tutorial 7: Engineering Applications of Matrices and Vectors

1. An electrical engineer supervises the production of three types of electrical components. Three kinds of materials are; metal, plastic and rubber – are required for production. The amounts needed to produce each component are

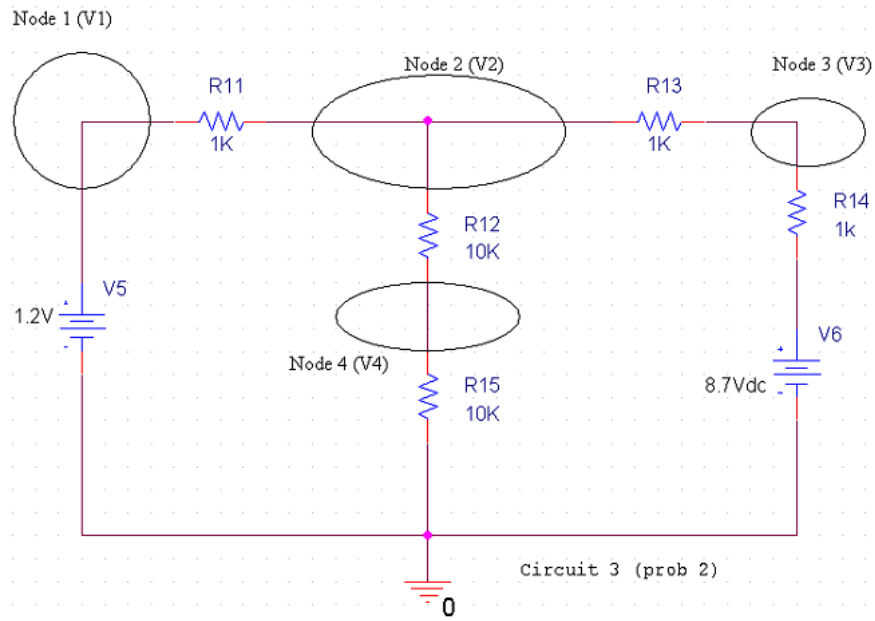| Component	Metal (g/component)	Plastic (g/component)	Rubber (g/component)
1	15	0.25	1.0
2	17	0.33	1.2
3	19	0.42	1.6

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?

2. A civil engineer involved in construction requires 4800, 5800 and 5700 m^3 of sand, fine gravel and coarse gravel respectively for building a project. There are three pits from which these materials can be obtained. The composition of these pits is

	Sand %	Fine Gravel %	Coarse Gravel %
Pit1	52	30	18
Pit2	20	50	30
Pit3	25	20	55

How many cubic meters must be hauled from each pit in order to meet the engineer's needs?

3. By referring to the schematic below, find V_1, V_2, V_3 and V_4. Solve the problem using Cramer's rule.

Node 1 (V1)

Node 2 (V2)

Node 3 (V3)

R11
1K

R13
1K

R12
10K

R14
1k

V5
1.2V

Node 4 (V4)

R15
10K

8.7Vdc

V6

Circuit 3 (prob 2)

0

4. By referring to the schematic below, find V_2, and V_3. Solve the problem using Cramer's rule.

Node 1 (V1)

R1
1K

Node 2 (V2) R3

Node 3 (V3)

8.7Vdc

V1

R2
10k

R4
10k

0