$$A = \begin{vmatrix} 3 & 5 & 1 & 0 \\ 2 & -2 & 1 & -1 \end{vmatrix} \qquad B = \begin{vmatrix} 2 & 3 & 1 \\ 0 & 1 & 0 \\ -2 & 2 & 5 \\ 2 & 2 & 1 \end{vmatrix}$$

$$B1 = \begin{vmatrix} 10 & 6 \\ 12 & 9 \\ 1 & 3 \\ 0 & 1 \end{vmatrix} \qquad C1 = \begin{vmatrix} 10 & 12 & 1 & 0 \\ 6 & 9 & 3 & 1 \end{vmatrix}$$

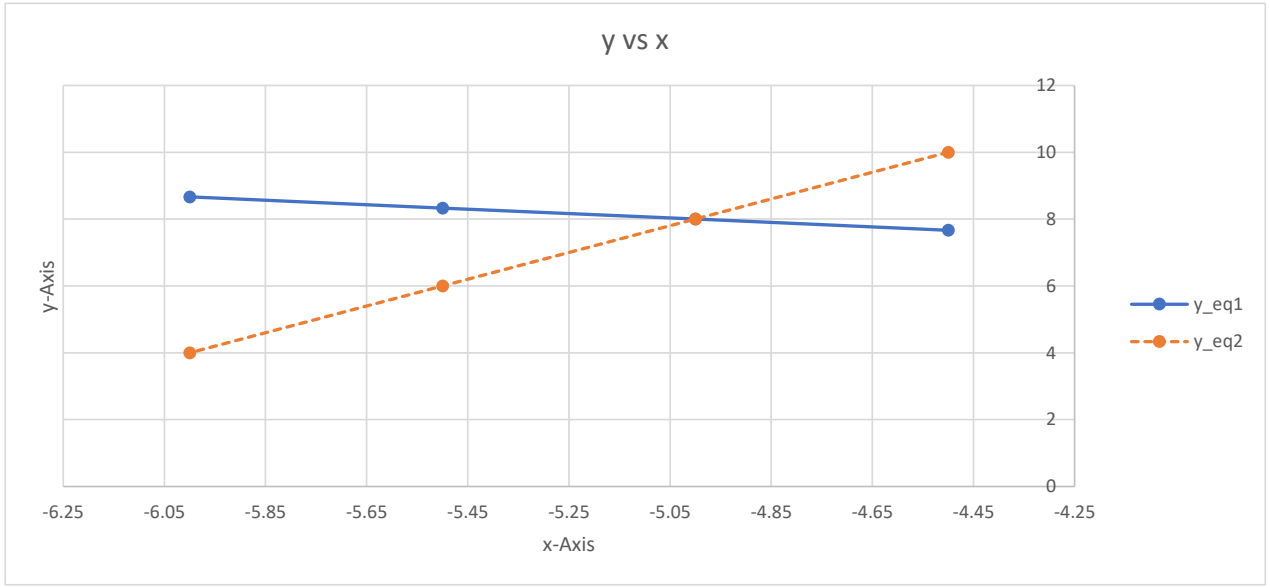
$$c = \begin{vmatrix} 4 & 16 & 8 \\ 0 & 4 & 6 \end{vmatrix}$$

$$A2 = \begin{vmatrix} 2 & 5 & 6 \\ -1 & 0 & 5 \\ 3 & 2 & 2 \end{vmatrix} \qquad \det(A2) = 53$$

$$A2\ inv = \begin{vmatrix} -0.188679 & 0.037736 & 0.471698 \\ 0.320755 & -0.264151 & -0.301887 \\ -0.037736 & 0.207547 & 0.09434 \end{vmatrix}$$

$$A2*A2inv = \begin{vmatrix} 1 & 0 & -1.11E\text{-}16 \\ 2.78E\text{-}17 & 1 & -5.55E\text{-}17 \\ 0 & 0 & 1 \end{vmatrix}$$

x	y_eq1	y_eq2
-4.5	**7.666667**	10
-5	**8**	8
-5.5	**8.333333**	6
-6	**8.666667**	4



x	y_eq1	y_eq2	y_eq1-yeq2
-5	**8**	8	0
-5	**8**	8	
-5.5	**8.333333**	6	
-6	**8.666667**	4	

Resistance (ohms)	
R1	10
R2	5
R3	20
R4	10

$$A = \begin{vmatrix} 1 & -1 & -1 \\ 10 & 5 & 0 \\ 0 & 5 & -30 \end{vmatrix}$$

$$C = \begin{vmatrix} 0 \\ 12 \\ 0 \end{vmatrix}$$

$$A^{-1} = \begin{vmatrix} 0.3 & 0.07 & -0.01 \\ -0.6 & 0.06 & 0.02 \\ -0.1 & 0.01 & -0.03 \end{vmatrix}$$

$$X = \begin{vmatrix} 0.84 \\ 0.72 \\ 0.12 \end{vmatrix}$$

Current (amps)	
I1	0.84
I2	0.72
I3	0.12

```
clc;clear

r1=5;
r2=25;
r3=12;
r4=6;
r5=15;


v1=110;
v2=45;

a1=[1 -1 -1 0 0];
a2=[0 0 1 -1 -1];
a3=[r1 r2 0 0 0];
a4 = [0 r2 -r3 -r4 0];
a5=[0 0 0 r4 -r5];
a=[a1; a2; a3; a4; a5];

c= [0;0;v1;0;v2];

x=inv(a)*c
```

```
x =

    6.8778
    3.0244
    3.8533
    4.8952
   -1.0419
```

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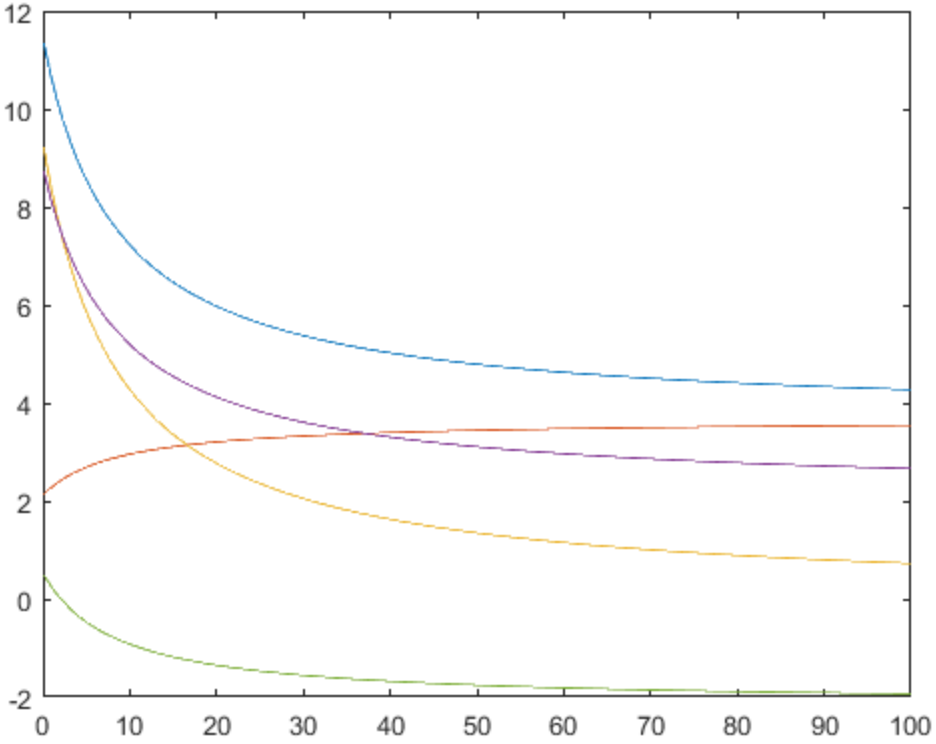
```
%Define the values of the resistors R1, R2, R4, and R5 in Oghms;
R1=5;
R2=25;
R4=6;
R5=15;

%Define the value of the voltage sources, V1 V2 in Volts;
V1=110;
V2=45;

%Vary the resistance of R3 from 0.1-100 and find I
for m=1:1000;
    R3(m)=m/10;

%Define the coefficient matrix A, Row by Row;
    A1=[1 -1 -1 0 0];
    A2=[0 0 1 -1 -1];
    A3=[R1 R2 0 0 0];
    A4=[0 R2 -R3(m) -R4 0];
    A5=[0 0 0 R4 -R5];
    A=[A1; A2; A3; A4; A5];

% Define the constants matric C;
    C=[0; 0; V1; 0; V2];

%Calculate the currents (X matrix);
    X=inv(A)*C;

%Extract the current from the X matrix;
    I1(m)=X(1);
    I2(m)=X(2);
    I3(m)=X(3);
    I4(m)=X(4);
    I5(m)=X(5);
end;

%Make plot of the currents as functions of R3
plot(R3,I1,R3,I2,R3,I3,R3,I4,R3,I5)
```



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x1	3.000406		
x2	6.990956		
			y Squared
y1	-0.003289		1.08E-05
y2	-0.062496		0.003906
		Sum	0.003917

x	1.5			x	-1		
y	12.5			y	0		
f-1	0	F-1^2	0	f-1	0	F-1^2	0
f-2	0	F-2^2	0	f-2	0	F-2^2	0
		sum	0			sum	0

x	0.25		
y	2.1875		
f-1	0.9375	F-1^2	0.878906
f-2	-0.9375	F-2^2	0.878906
		sum	1.757813