Calculate the most probable values of X and Y for the following system of equations using:

(a) Tabular method.
(b) Matrix method.

$3X + 4Y = 24.1 + v1$
$5X - 2Y = 13.8 + v2$
$X - 3Y = 13.2 + v3$

EQN	a	b	l	a^2	ab	b^2	al	bl
1	3	4	3.0	9.0	12.0	16.0	9.0	12.0
2	5	-2	1.5	25.0	-10.0	4.0	7.5	-3.0
3	1	3	0.2	1.0	3.0	9.0	0.2	0.6
Totals				**35.0**	**5.0**	**29.0**	**16.7**	**9.6**

X	**35.0**	**5.0**	**=**	**16.7**
Y	**5.0**	**29.0**		**9.6**

n=A'*A

N=

35.0	5
5	29

Inv(N)=

0.0293	-0.0051
-0.0051	0.0354

A'*L

154.5
108.4

=inv(N)*A*L

3.97401
3.04941

Matrix method

This part was entirely done using Matlab. I will paste the code in here so I can keep everything in one place.

Matrix method code:

```
% Calculating the most probable values of X and Y for the following system of equations using:
% Matrix method.
% 3X + 4Y = 24.1 + v1
% 5X − 2Y = 13.8 + v2
% X +3Y = 13.2 + v3
```

```
A=[3 4;5 -2;1 3]
% X=[x;y]
L=[24.1;13.8;13.2]

N=A'*A
X = inv(N)*(A'*L)
V=A*X-L
```

Solution:

```
>> part_1_HM8


A =

     3     4
     5    -2
     1     3


L =

   24.1000
   13.8000
   13.2000


N =

    35     5
     5    29


X =

    3.9783
    3.0520


V =

    0.0429
   -0.0126
   -0.0657
>>
```

11.11 The following coordinates of points on a line were computed for a block. What are the slope and y-intercept of the line? What is the azimuth of the line?

Point	*X* (ft)	*Y* (ft)
1	1254.72	3373.22
2	1362.50	3559.95
3	1578.94	3934.80
4	1843.68	4393.35

Point	x	y	x*y	x^2
1	1254.72	3373.22		
2	1362.5	3559.95	4232446.598	1574322
3	1578.94	3934.8	4850431.875	1856406
4	1843.68	4393.35	6212813.112	2493052
Total	**6039.84**	**15261.32**	8099931.528	3399156
			23395623.11	**9322936**

Data

X= 6039.84 ft

Y= 15261.32 ft

B= n*sum(x*y)-sum(x*y)/(n*sum(x*y)^2)-(sum(x*y)^2)

Note: n is not the Normal but the number of n eqns. 1+1+1+1 etc.

B= 4 23395623.1

4 9322936 6039.84 15261.32

36479667.23

B= **1.73**

A= Sum(y/n)-b(sum(x/n)

A= 3815.33 -

1.732054787 1509.96

A= 1200.00

Slope= 1.73205479

Y-intercept 1199.99655

Slope=m=tan(theta)= 1.73205479

Tan^1(θ)= 1.04719855

= **60.00006**

Now, Based on this answer we convert it to an azimuth:

= 90 - 60.00005701

= **29.99994** **or==>** **29° 59' 59.79"**