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

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

$$3X + 4Y = 24.1 + v1$$

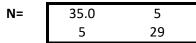
$$5X - 2Y = 13.8 + v2$$

$$X - 3Y = 13.2 + v3$$

| EQN | а | b | I | a^2 | ab | ŀ | o^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 |

| Х | 35.0 | 5.0 | = | 16.7 |
|---|------|------|---|------|
| Υ | 5.0 | 29.0 | | 9.6 |

n=A'*A



Inv(N)=

| 0.0293 | -0.0051 |
|---------|---------|
| -0.0051 | 0.0354 |

A'*L

=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 | ts on a line were computed for a block. |
|-------|--------------------------------------|--|
| What | are the slope and v-intercept of the | e 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 |
| 1 2 3 4 | 1843.68 | 4393.35 |
| | | |

| Point | 2 | x y | 7 | | |
|-------|---|---------|----------|-------------|---------|
| | 1 | 1254.72 | 3373.22 | x*y | x^2 |
| | 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.

<u>6039.84</u> <u>15261.32</u>

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"
```