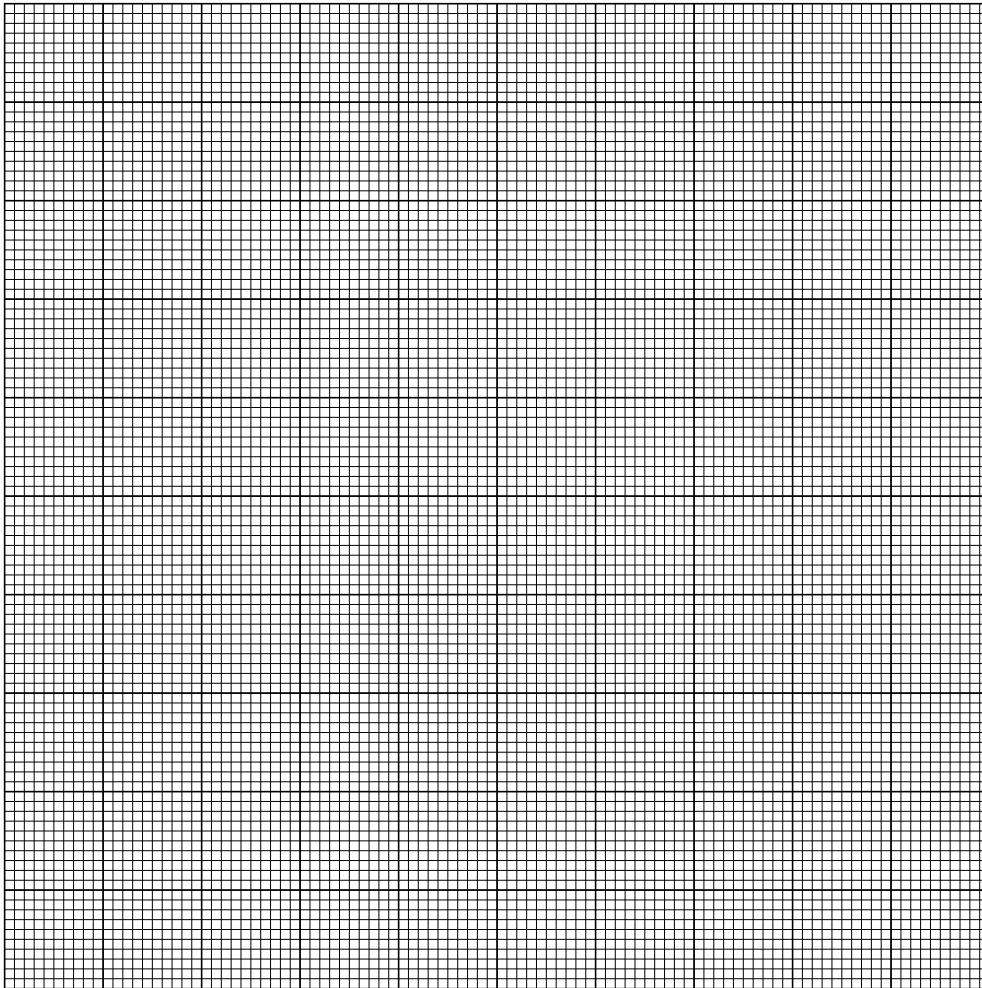


1. Problem:

You have collected the following data:

x	y
8.1	8.6
4.7	7.6
8.9	7.4
9.5	7.6
1.4	10
5.8	8.9
9	8.4

Please plot the data and a corresponding regression line.



Solution: Remember the formula for the correlation coefficient.

$$r = \frac{\sum x_i y_i - n\bar{x}\bar{y}}{(n-1)s_x s_y}$$

We calculate the necessary values.

x	y	xy
8.1	8.6	69.66
4.7	7.6	35.72
8.9	7.4	65.86
9.5	7.6	72.2
1.4	10	14
5.8	8.9	51.62
9	8.4	75.6
$\sum x = 47.4$	$\sum y = 58.5$	$\sum x_i y_i = 384.66$
$\bar{x} = 6.77142857142857$	$\bar{y} = 8.35714285714286$	
$s_x = 2.97$	$s_y = 0.924$	

The regression line has the form

$$y = a + bx$$

So, a is the y -intercept and b is the slope. We have formulas to determine them:

$$b = r \frac{s_y}{s_x} = -0.698 \cdot \frac{0.924}{2.97} = -0.217$$

$$a = \bar{y} - b\bar{x} = 8.3571429 - -0.217 \cdot 6.7714286 = 9.83$$

Our regression line:

$$y = 9.83 + -0.217x$$

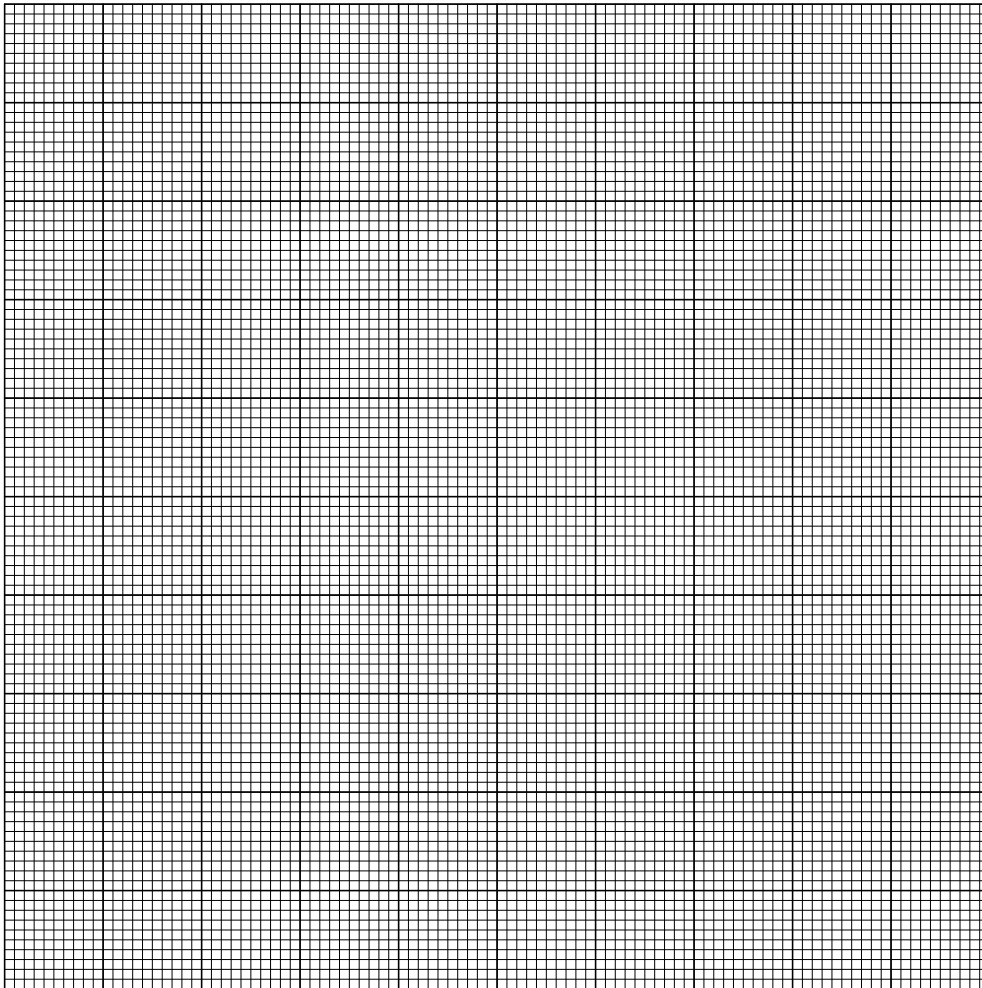
Make a plot.

2. Problem:

You have collected the following data:

x	y
6.3	9
3.6	6.5
2.3	5.1
9.7	12
9.1	12
7.2	11
8.2	11
1.2	3.4

Please plot the data and a corresponding regression line.



Solution: Remember the formula for the correlation coefficient.

$$r = \frac{\sum x_i y_i - n \bar{x} \bar{y}}{(n-1)s_x s_y}$$

We calculate the necessary values.

x	y	xy
6.3	9	56.7
3.6	6.5	23.4
2.3	5.1	11.73
9.7	12	116.4
9.1	12	109.2
7.2	11	79.2
8.2	11	90.2
1.2	3.4	4.08
$\sum x = 47.6$	$\sum y = 70$	$\sum x_i y_i = 490.91$
$\bar{x} = 5.95$	$\bar{y} = 8.75$	
$s_x = 3.21$	$s_y = 3.34$	

The regression line has the form

$$y = a + bx$$

So, a is the y -intercept and b is the slope. We have formulas to determine them:

$$b = r \frac{s_y}{s_x} = 0.99 \cdot \frac{3.34}{3.21} = 1.03$$

$$a = \bar{y} - b\bar{x} = 8.75 - 1.03 \cdot 5.95 = 2.62$$

Our regression line:

$$y = 2.62 + 1.03x$$

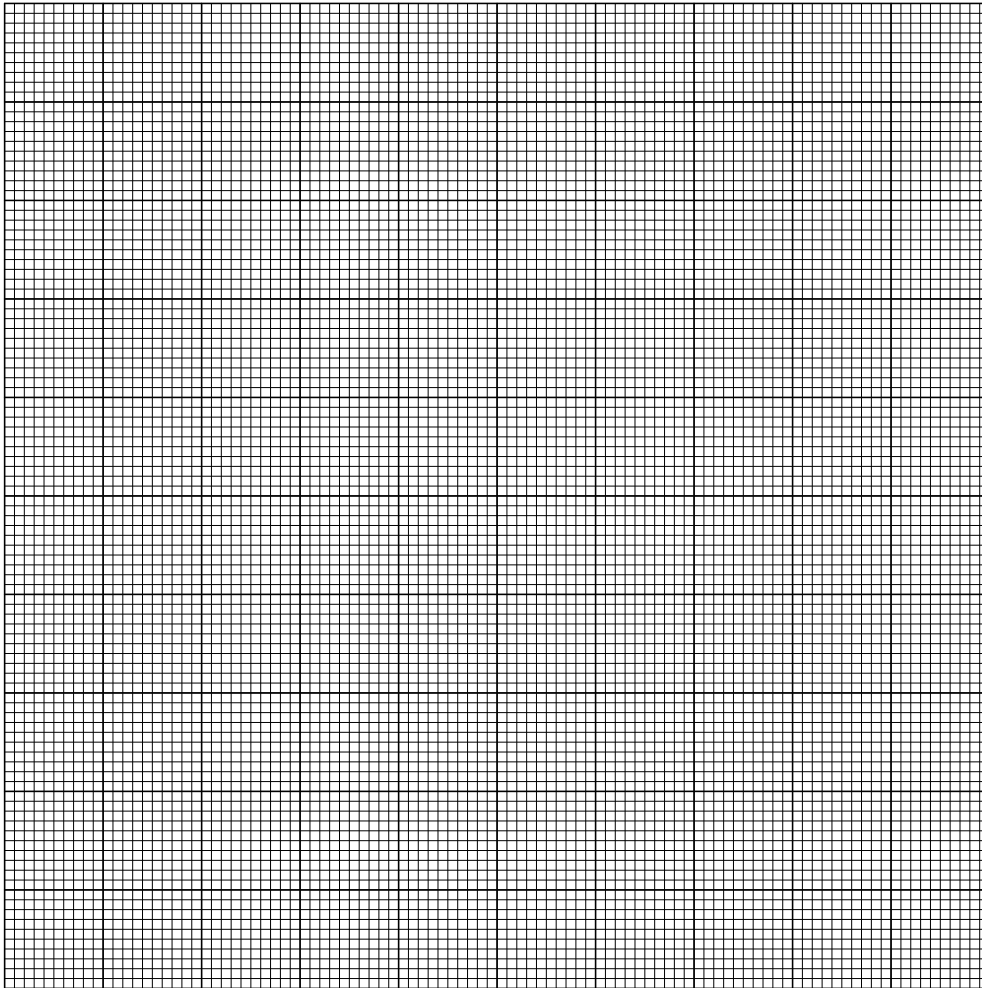
Make a plot.

3. Problem:

You have collected the following data:

x	y
2.1	7.2
7.8	2
9.1	0.74
4.4	4.9
7	2
1.9	6.3

Please plot the data and a corresponding regression line.



Solution: Remember the formula for the correlation coefficient.

$$r = \frac{\sum x_i y_i - n\bar{x}\bar{y}}{(n-1)s_x s_y}$$

We calculate the necessary values.

x	y	xy
2.1	7.2	15.12
7.8	2	15.6
9.1	0.74	6.734
4.4	4.9	21.56
7	2	14
1.9	6.3	11.97
$\sum x = 32.3$	$\sum y = 23.14$	$\sum x_i y_i = 84.984$
$\bar{x} = 5.383333333333333$	$\bar{y} = 3.856666666666667$	
$s_x = 3.04$	$s_y = 2.64$	

The regression line has the form

$$y = a + bx$$

So, a is the y -intercept and b is the slope. We have formulas to determine them:

$$b = r \frac{s_y}{s_x} = -0.987 \cdot \frac{2.64}{3.04} = -0.857$$

$$a = \bar{y} - b\bar{x} = 3.8566667 - (-0.857 \cdot 5.3833333) = 8.47$$

Our regression line:

$$y = 8.47 + -0.857x$$

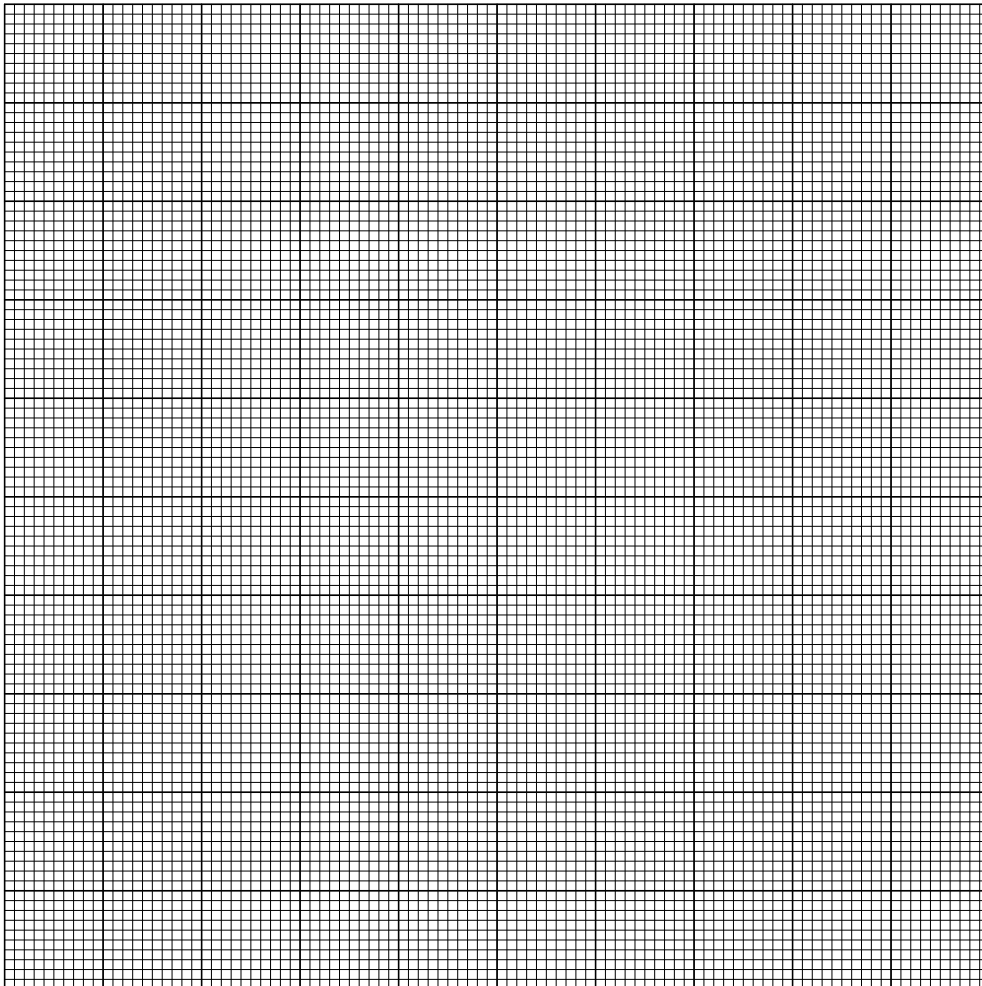
Make a plot.

4. Problem:

You have collected the following data:

x	y
2	120
3.2	140
7	200
4.8	170
8.1	220
1.9	120
4.9	170

Please plot the data and a corresponding regression line.



Solution: Remember the formula for the correlation coefficient.

$$r = \frac{\sum x_i y_i - n\bar{x}\bar{y}}{(n-1)s_x s_y}$$

We calculate the necessary values.

x	y	xy
2	120	240
3.2	140	448
7	200	1400
4.8	170	816
8.1	220	1782
1.9	120	228
4.9	170	833
$\sum x = 31.9$	$\sum y = 1140$	$\sum x_i y_i = 5747$
$\bar{x} = 4.55714285714286$	$\bar{y} = 162.857142857143$	
$s_x = 2.39$	$s_y = 38.6$	

The regression line has the form

$$y = a + bx$$

So, a is the y -intercept and b is the slope. We have formulas to determine them:

$$b = r \frac{s_y}{s_x} = 0.999 \cdot \frac{38.6}{2.39} = 16.1$$

$$a = \bar{y} - b\bar{x} = 162.8571429 - 16.1 \cdot 4.5571429 = 89.5$$

Our regression line:

$$y = 89.5 + 16.1x$$

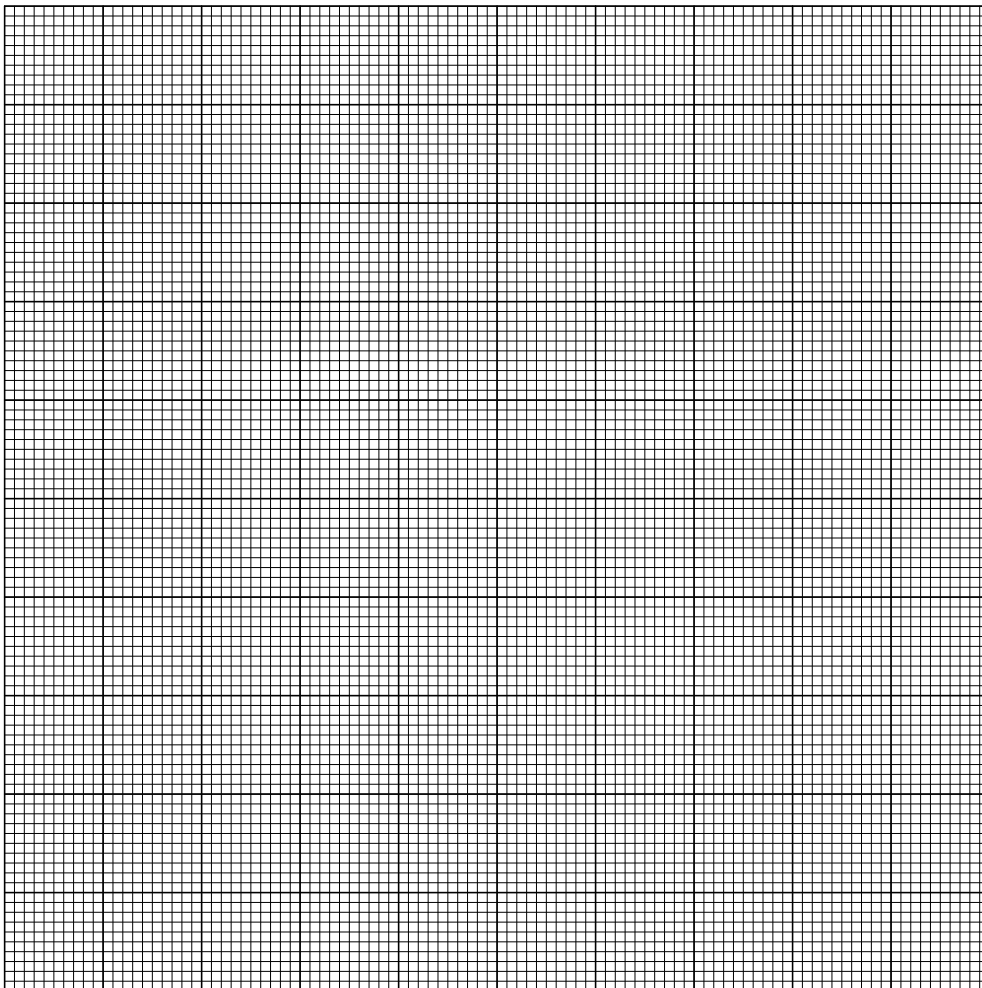
Make a plot.

5. Problem:

You have collected the following data:

x	y
9	120
9.2	100
6.5	75
4.7	56
2.3	67
9.4	91
3.7	61
1.5	50

Please plot the data and a corresponding regression line.



Solution: Remember the formula for the correlation coefficient.

$$r = \frac{\sum x_i y_i - n\bar{x}\bar{y}}{(n-1)s_x s_y}$$

We calculate the necessary values.

x	y	xy
9	120	1080
9.2	100	920
6.5	75	487.5
4.7	56	263.2
2.3	67	154.1
9.4	91	855.4
3.7	61	225.7
1.5	50	75
$\sum x = 46.3$	$\sum y = 620$	$\sum x_i y_i = 4060.9$
$\bar{x} = 5.7875$	$\bar{y} = 77.5$	
$s_x = 3.2$	$s_y = 24.2$	

The regression line has the form

$$y = a + bx$$

So, a is the y -intercept and b is the slope. We have formulas to determine them:

$$b = r \frac{s_y}{s_x} = 0.872 \cdot \frac{24.2}{3.2} = 6.59$$

$$a = \bar{y} - b\bar{x} = 77.5 - 6.59 \cdot 5.7875 = 39.4$$

Our regression line:

$$y = 39.4 + 6.59x$$

Make a plot.