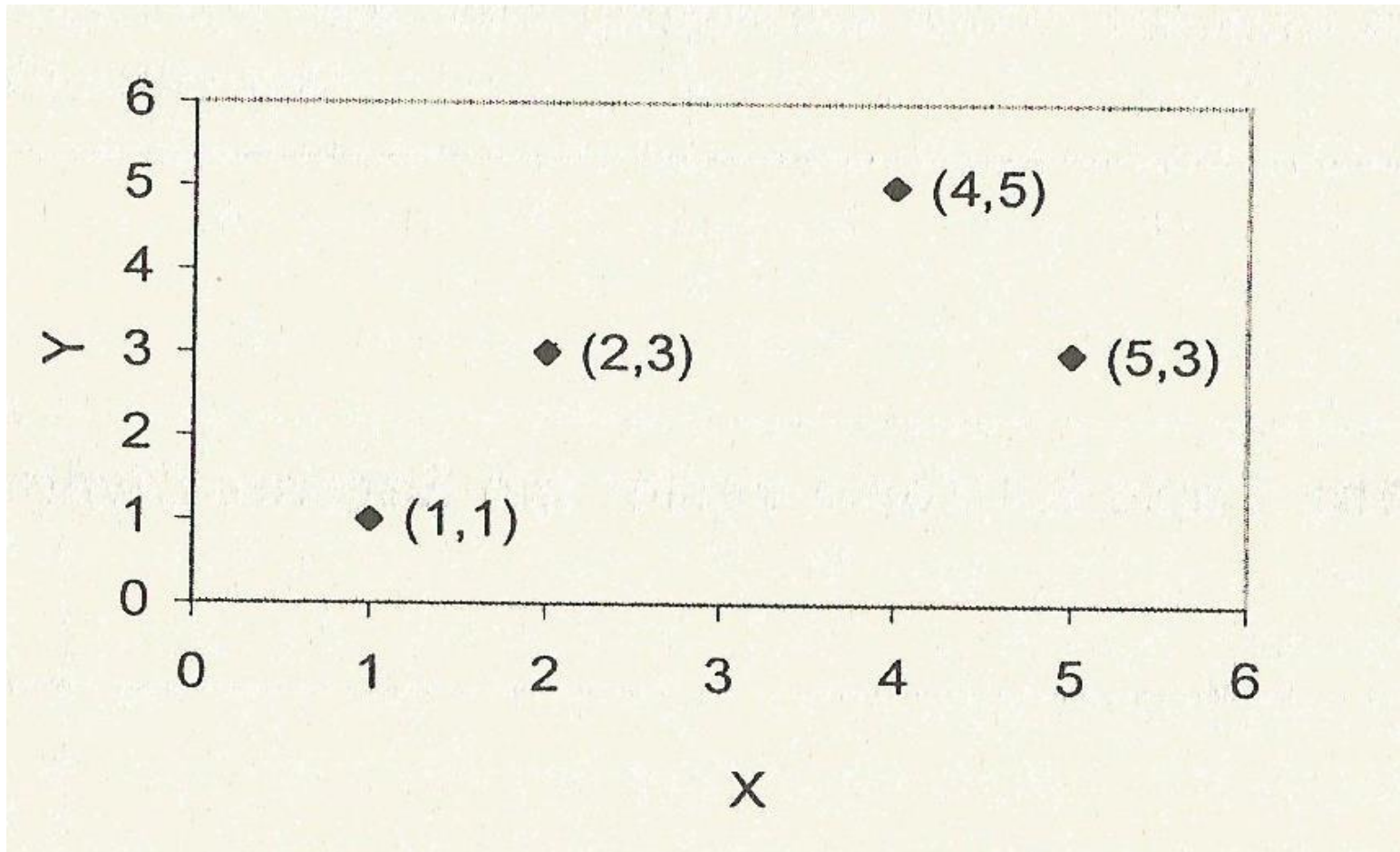


Basit Doğrusal Regresyon Eşitliği

$$\hat{y} = a + bx$$

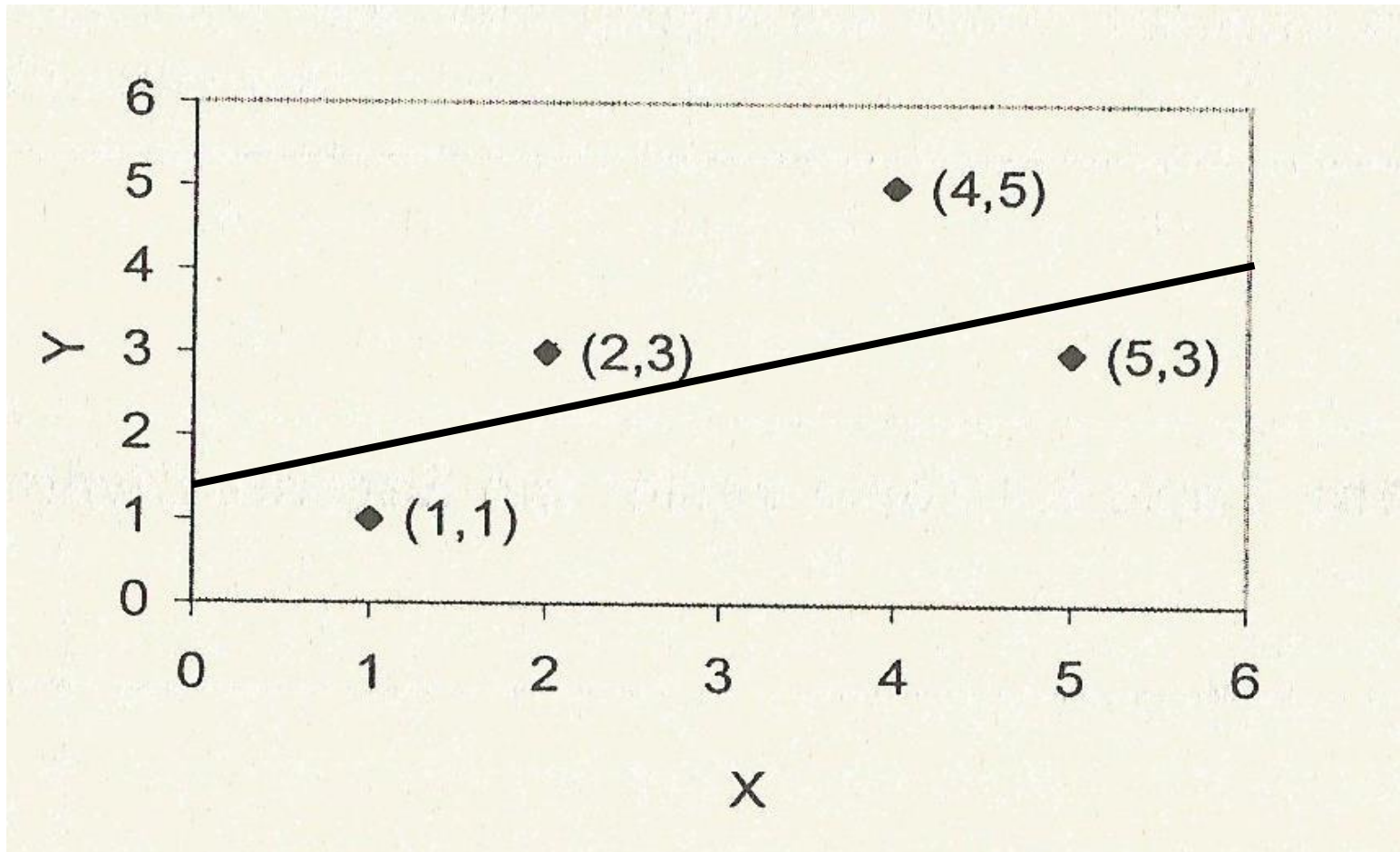
$$X = 2 - 4 - 1 - 5$$

$$y = 3 - 5 - 1 - 3$$



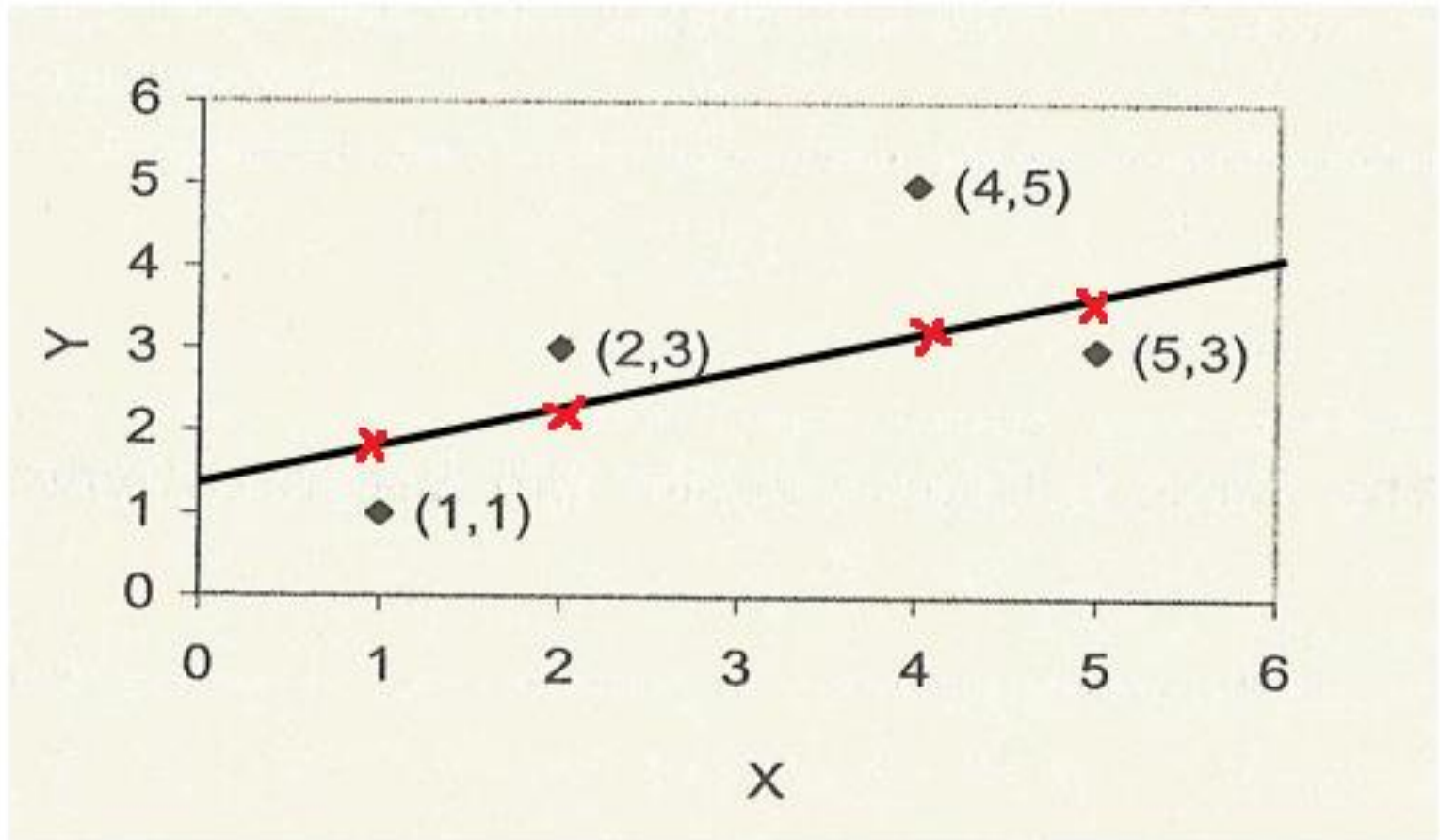
$X = 2 - 4 - 1 - 5$

$y = 3 - 5 - 1 - 3$



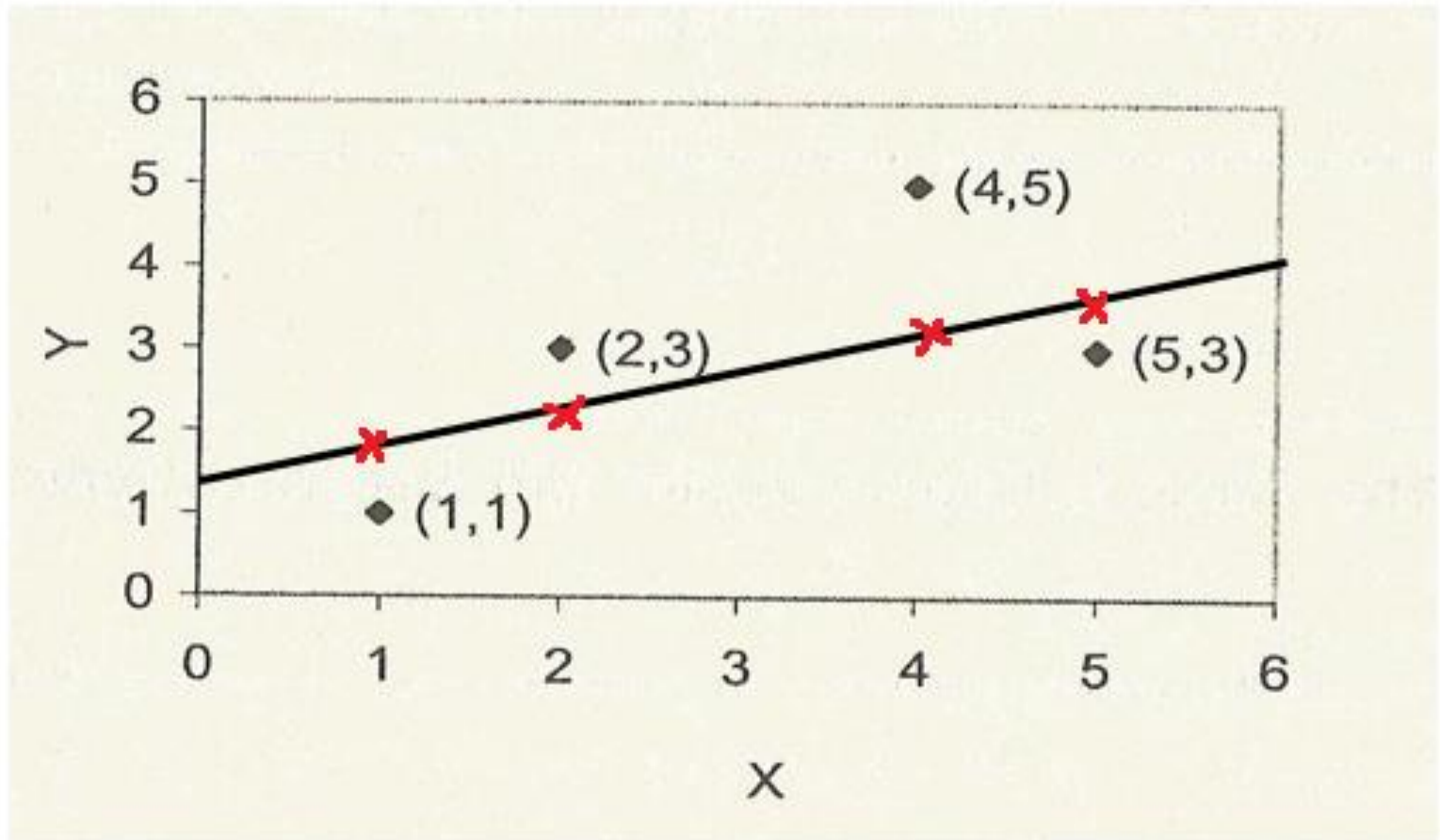
X= 2 - 4 - 1 - 5

y= 3 - 5 - 1 - 3



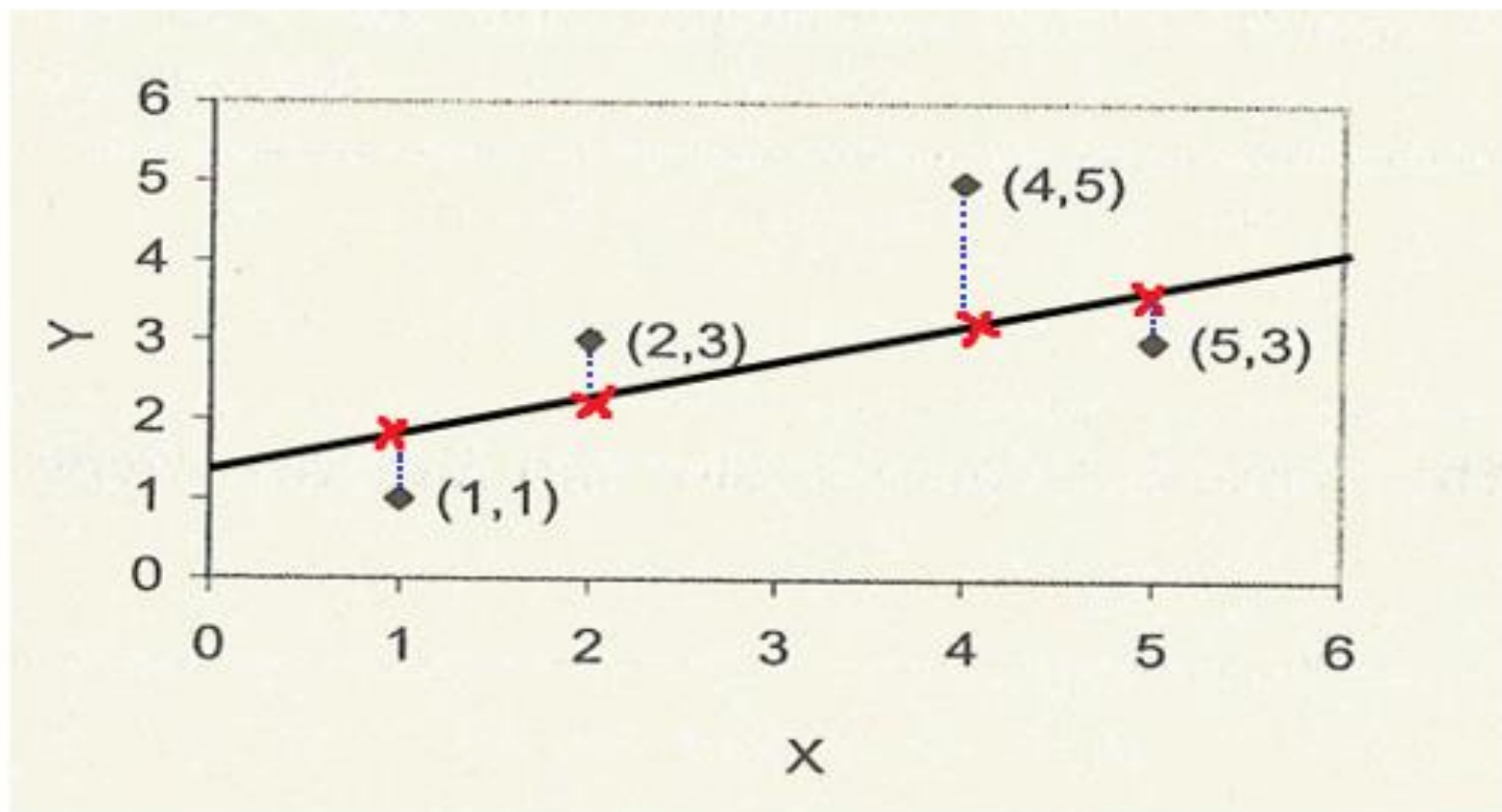
X= 2 - 4 - 1 - 5

y= 3 - 5 - 1 - 3

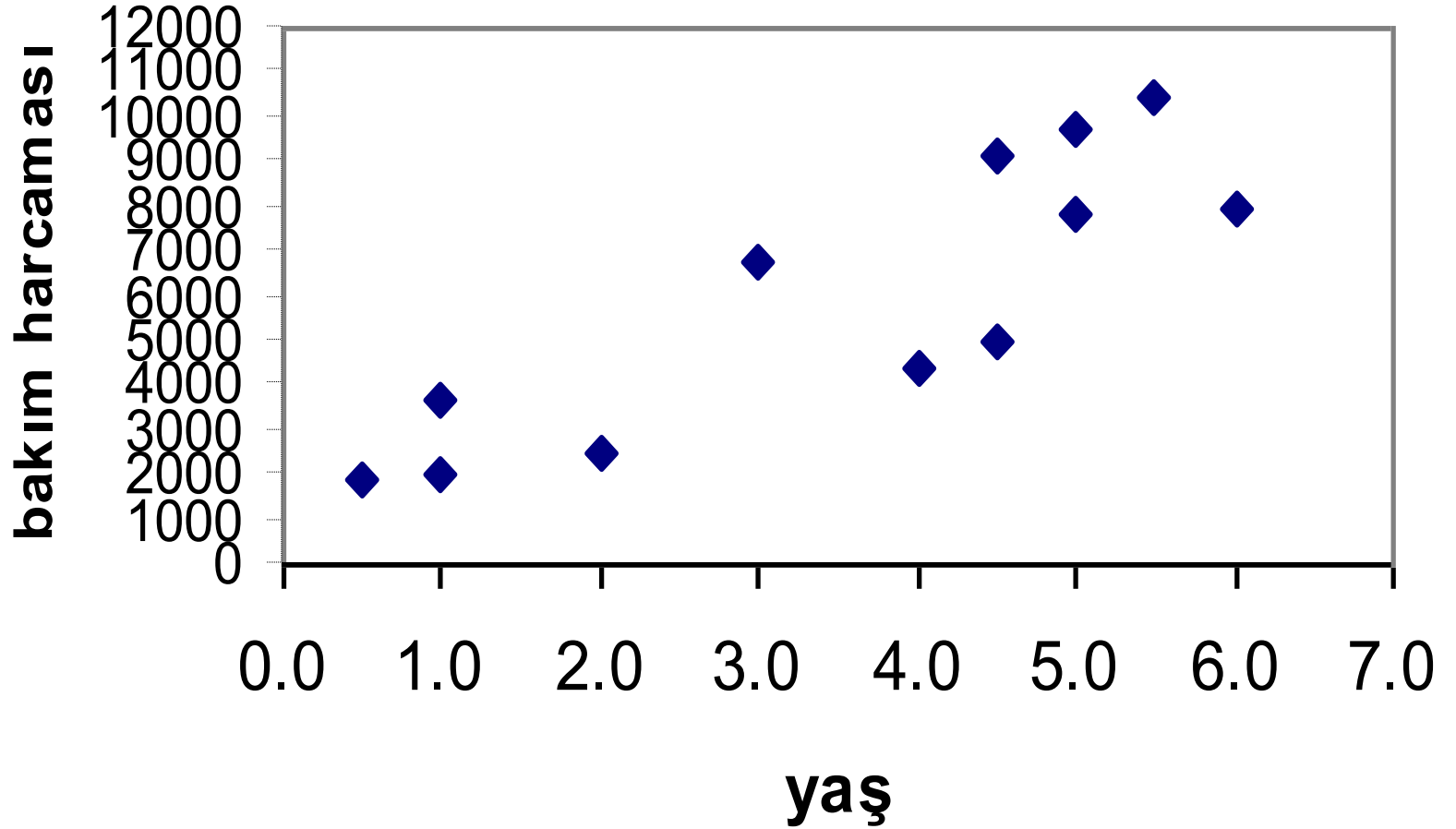


$X = 2 - 4 - 1 - 5$

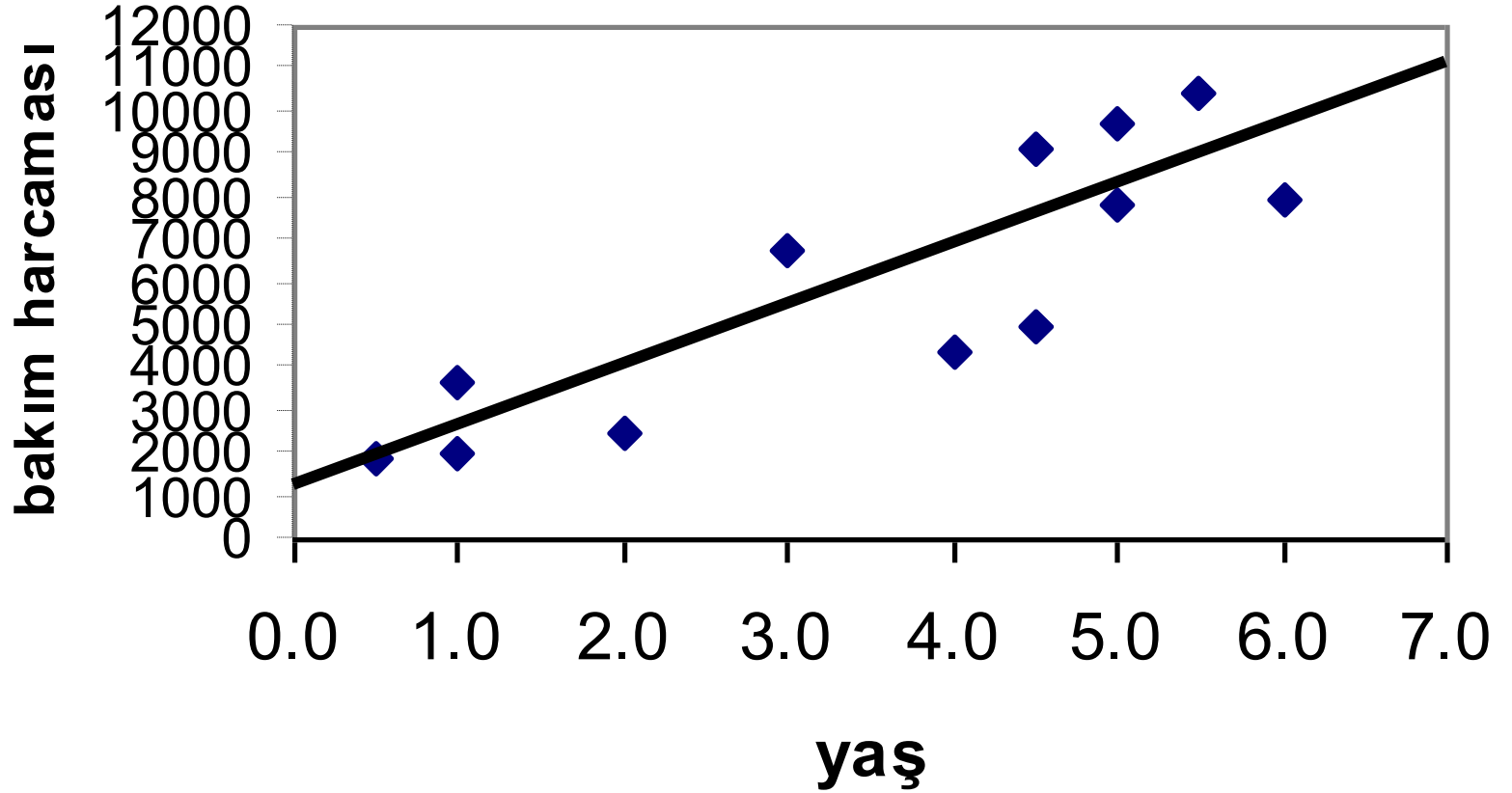
$y = 3 - 5 - 1 - 3$



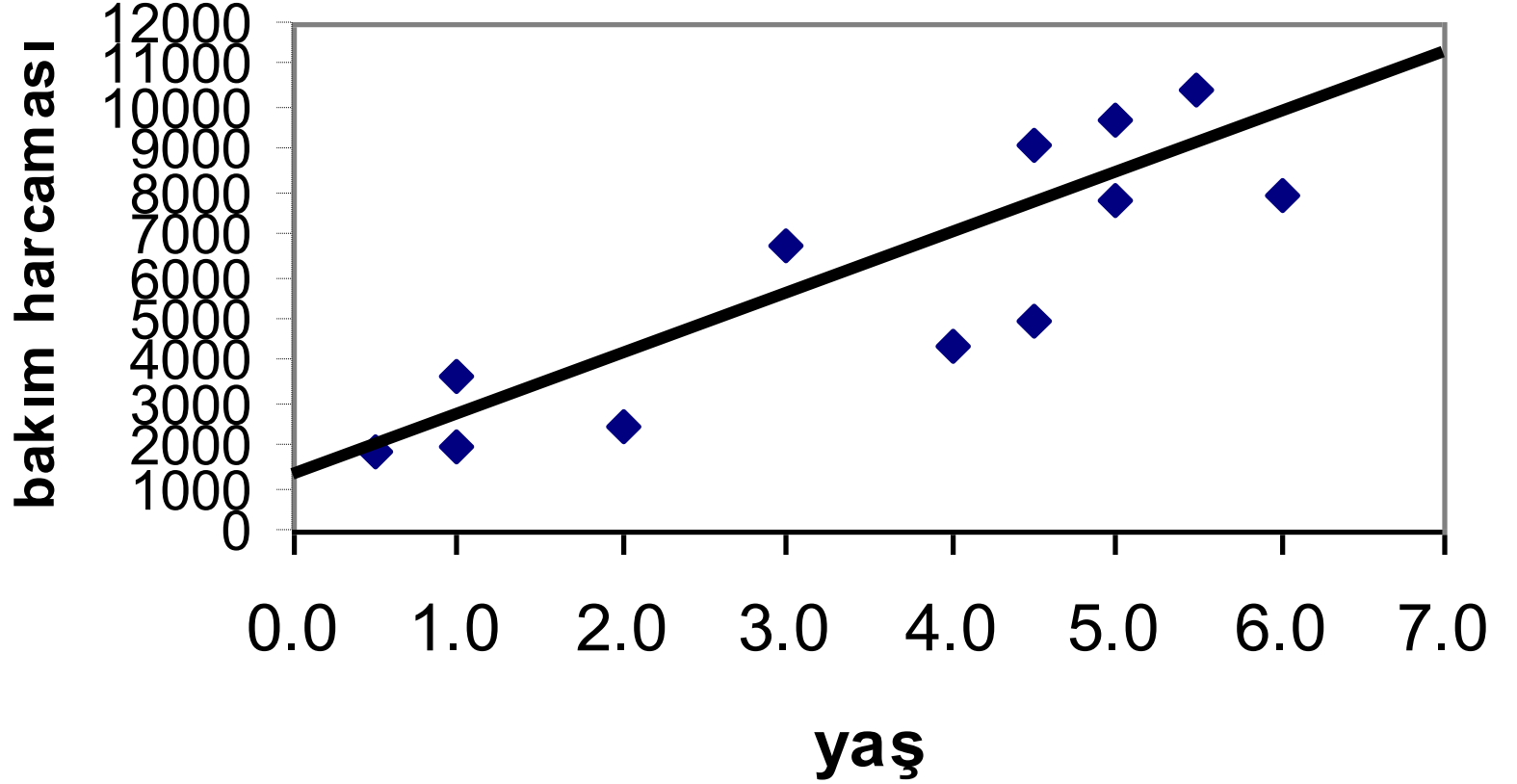
yaş-bakım harcaması grafiđi



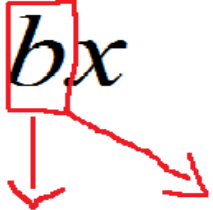
yaş-bakım harcaması grafiği



yaş-bakım harcaması grafiđi



Eğim (b) nasıl hesaplanır?

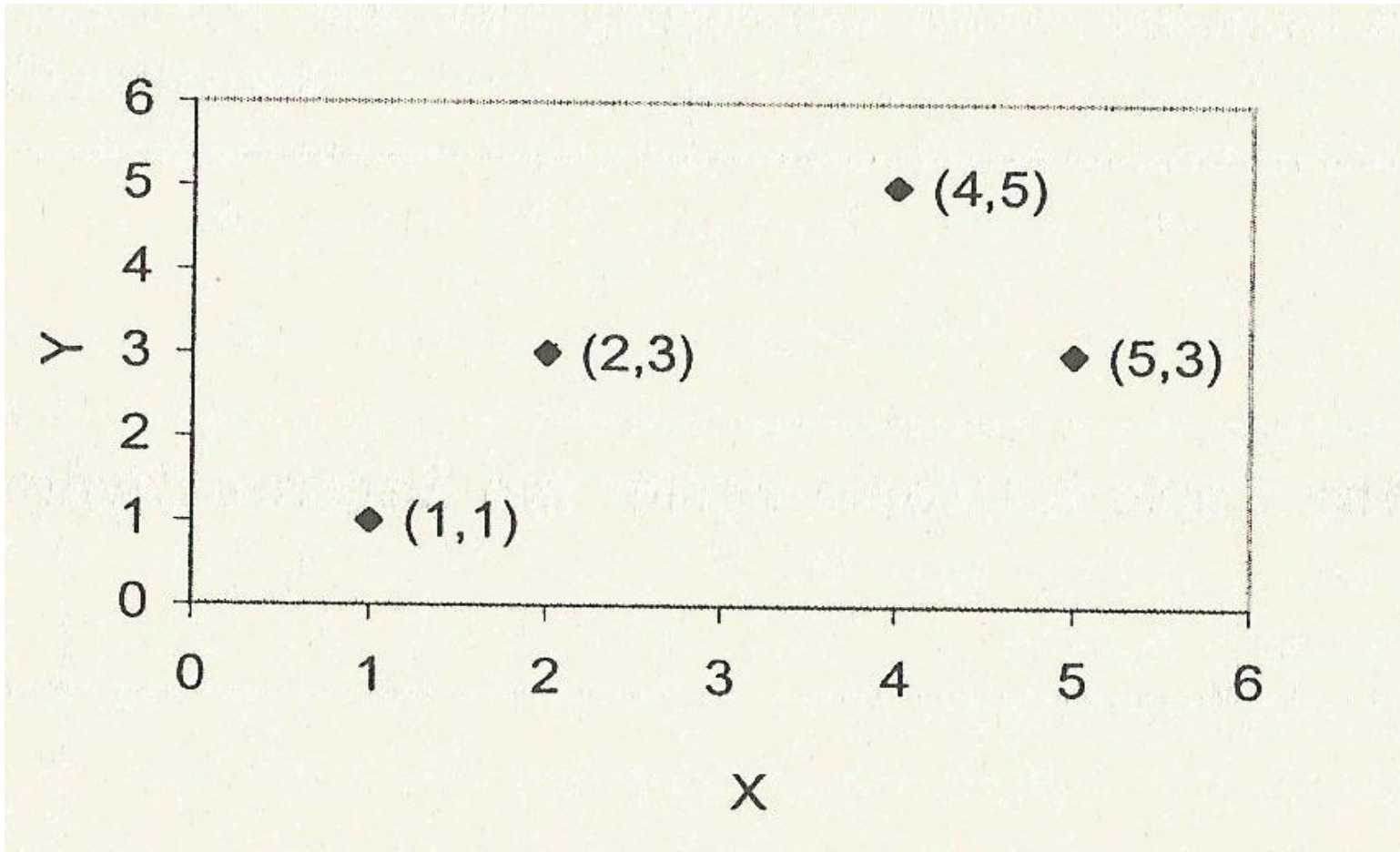
$$\hat{y} = a + bx$$


$$b = \frac{\sum (X - \bar{X}) \cdot (Y - \bar{Y})}{\sum (X - \bar{X})^2}$$

$$b = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

$$X = 2 - 4 - 1 - 5$$

$$y = 3 - 5 - 1 - 3$$



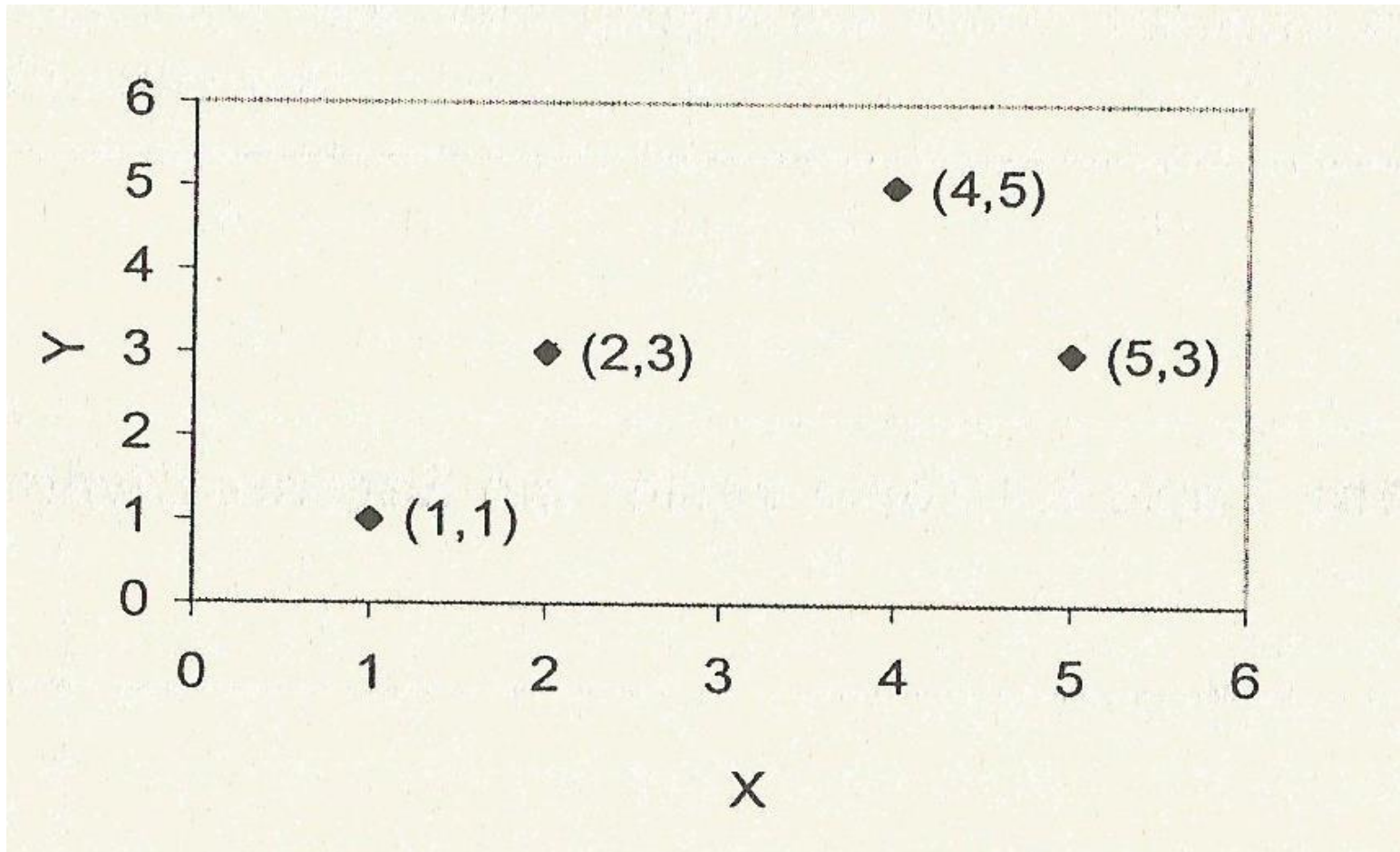
Başlangıç noktası (a) sabit değer nasıl hesaplanır?

$$\hat{y} = a + bx$$

$$a = \hat{y} - bx$$

$$X = 2 - 4 - 1 - 5$$

$$y = 3 - 5 - 1 - 3$$



- Verilen örnek için

b(eğim):0.6

a(sabit): 1.2

Hesaplanan bu katsayılar regresyon eşitliğinde yerlerine konulduğunda;

$$\hat{y} = 1.2 + 0.6X$$

<u>X</u>	<u>Y</u>
65	105
65	125
62	110
67	120
69	140
65	135
61	95
67	130

<u>X</u>	<u>Y</u>	<u>XY</u>
65	105	6825
65	125	8125
62	110	6820
67	120	8040
69	140	9660
65	135	8775
61	95	5795
67	130	8710

<u>X</u>	<u>Y</u>	<u>XY</u>	<u>X²</u>
65	105	6825	4225
65	125	8125	4225
62	110	6820	3844
67	120	8040	4489
69	140	9660	4761
65	135	8775	4225
61	95	5795	3721
67	130	8710	4489

<u>X</u>	<u>Y</u>	<u>XY</u>	<u>X²</u>
65	105	6825	4225
65	125	8125	4225
62	110	6820	3844
67	120	8040	4489
69	140	9660	4761
65	135	8775	4225
61	95	5795	3721
67	130	8710	4489
<hr/>	<hr/>	<hr/>	<hr/>
521	960	62750	33979

<u>X</u>	<u>Y</u>	<u>XY</u>	<u>X²</u>
65	105	6825	4225
65	125	8125	4225
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65	135	8775	4225
61	95	5795	3721
67	130	8710	4489
<hr/>	<hr/>	<hr/>	<hr/>
521	960	62750	33979

$$b = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

$$n = 8$$

=

$$b = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

$$n = 8$$

$$= \frac{8(62750) - (521)(960)}{8(33979) - (521)^2}$$

$$= \frac{8(62750) - (521.960)}{8(33979) - (521^2)}$$

$$= \frac{502000 - 500160}{271832 - 271441}$$

$$= \frac{1840}{391}$$

$$b = \underline{4.705}$$

$$y = a + bx$$

$$a = \bar{y} - b\bar{x} \quad \rightarrow \quad \bar{x} = 65,13$$

$$\bar{y} = 120$$

$$y = a + bx$$

$$a = \bar{Y} - b\bar{X} \rightarrow \bar{X} = 65,13$$
$$\bar{Y} = 120$$

$$= 120 - 4,71(65,13) = -188,71$$

~~$y = -188,71 + 4,71x$~~

$$y = -188,71 + 4,71x$$

X	Y
1	7
2	8
3	9
4	8
4	9
5	11
5	10
6	13
6	14
7	13

$$\hat{b} = \frac{n \sum XY - (\sum X)(\sum Y)}{n \sum X^2 - (\sum X)^2}$$

X	Y	XY	X²
1	7	7	1
2	8	16	4
3	9	27	9
4	8	32	16
4	9	36	16
5	11	55	25
5	10	50	25
6	13	78	36
6	14	84	36
7	13	91	49
43	102	476	217

$$\hat{b} = \frac{10(476) - (43)(102)}{10(217) - (43)^2}$$

$$\hat{b} = \frac{4760 - 4386}{2170 - 1849}$$

$$\begin{aligned}\hat{b} &= \frac{374}{321} \\ &= 1,165\end{aligned}$$

X	Y
1	7
2	8
3	9
4	8
4	9
5	11
5	10
6	13
6	14
7	13
43	102
4,3	10,2

$$a = \hat{y} - bx$$

$$a = 10,2 - 1,165(4,3)$$

$$a = 5,19$$

r^2 Nasıl Hesaplanır?

- r^2 (açıklanan varyans) değişkenlerin birindeki değişimin ne kadarının diğer değişkenler tarafından açıklandığını yüzde olarak eden bir değerdir.
- Determinasyon katsayısı olarak da isimlendirilir.

$$r^2 = \frac{\sum (\hat{Y} - \bar{Y})^2}{\sum (Y - \bar{Y})^2} \quad bx$$

Tahmini “Y” değeri hesaplama

$$X1= 5,195+1,165*1=6,36$$

$$X2= 5,195+1,165*2=7,53$$

$$X3= 5,195+1,165*3=8,69$$

$$X4= 5,195+1,165*4=9,86$$

$$X4= 5,195+1,165*4=9,86$$

$$X5= 5,195+1,165*5=11,02$$

$$X5= 5,195+1,165*5=11,02$$

$$X6=5,195+1,165*6=12,19$$

$$X6=5,195+1,165*6=12,19$$

$$X7=5,195+1,165*7=13,35$$

\hat{Y}	$\hat{Y}-\bar{Y}$	$(\hat{Y}-\bar{Y})^2$	$Y-\bar{Y}$	$(Y-\bar{Y})^2$
6,36	-3,84	14,75	-3,20	10,24
7,53	-2,67	7,13	-2,20	4,84
8,69	-1,51	2,28	-1,20	1,44
9,86	-0,34	0,12	-2,20	4,84
9,86	-0,34	0,12	-1,20	1,44
11,02	0,82	0,67	0,80	0,64
11,02	0,82	0,67	-0,20	0,04
12,19	1,99	3,96	2,80	7,84
12,19	1,99	3,96	3,80	14,44
13,35	3,15	9,92	2,80	7,84
		43,57		53,6

$$r^2 = \frac{\sum (\hat{Y} - \bar{Y})^2}{\sum (Y - \bar{Y})^2}$$

$$r^2 = \frac{43,57}{53,6} = 0,81$$

X	Y	$X-\bar{X}$	$(X-\bar{X})^2$	$Y-\bar{Y}$	$(X-\bar{X}).(Y-\bar{Y})$
4	45	-1,50	2,25	-5,5	8,25
2	40	-3,50	12,25	-10,5	36,75
3	28	-2,50	6,25	-22,5	56,25
4	55	-1,50	2,25	4,5	-6,75
7	62	1,50	2,25	11,5	17,25
5	45	-0,50	0,25	-5,5	2,75
7	40	1,50	2,25	-10,5	-15,75
10	80	4,50	20,25	29,5	132,75
12	90	6,50	42,25	39,5	256,75
1	20	-4,50	20,25	-30,5	137,25
5,5	50,5	0,00	110,5	0	625,5

$$b = \frac{\sum (X - \bar{X}) \cdot (Y - \bar{Y})}{\sum (X - \bar{X})^2}$$

$$b = \frac{625,5}{110,5} \quad b = 5,66$$

$$a = \hat{y} - bx$$

$$a = \hat{y} - bx$$

$$a = 50,5 - 5,66 \cdot 5,5$$

$$a = 19,37$$

$$\hat{y} = 19,37 + 5,66X$$

X	Y	\hat{Y}
4	45	42,01
2	40	30,69
3	28	36,35
4	55	42,01
7	62	58,99
5	45	47,67
7	40	58,99
10	80	75,97
12	90	87,29
1	20	25,03

$Y-\bar{Y}$	$(Y-\bar{Y})^2$	$\hat{Y}-\bar{Y}$	$(\hat{Y}-\bar{Y})^2$
-5,5	30,25	-8,49	72,0801
-10,5	110,25	-19,81	392,436
-22,5	506,25	-14,15	200,223
4,5	20,25	-8,49	72,0801
11,5	132,25	8,49	72,0801
-5,5	30,25	-2,83	8,0089
-10,5	110,25	8,49	72,0801
29,5	870,25	25,47	648,721
39,5	1560,25	36,79	1353,5
-30,5	930,25	-25,47	648,721
0	4300,5	0,00	3539,93

$$r^2 = \frac{\sum (\hat{Y} - \bar{Y})^2}{\sum (Y - \bar{Y})^2}$$

$$r^2 = \frac{3539,93}{4300,5} = 0,82$$

$$S_{YX} = \sqrt{\frac{\sum (Y - \hat{Y})^2}{n - 2}}$$

$$S_{YX} = S_y \sqrt{1 - r^2}$$