

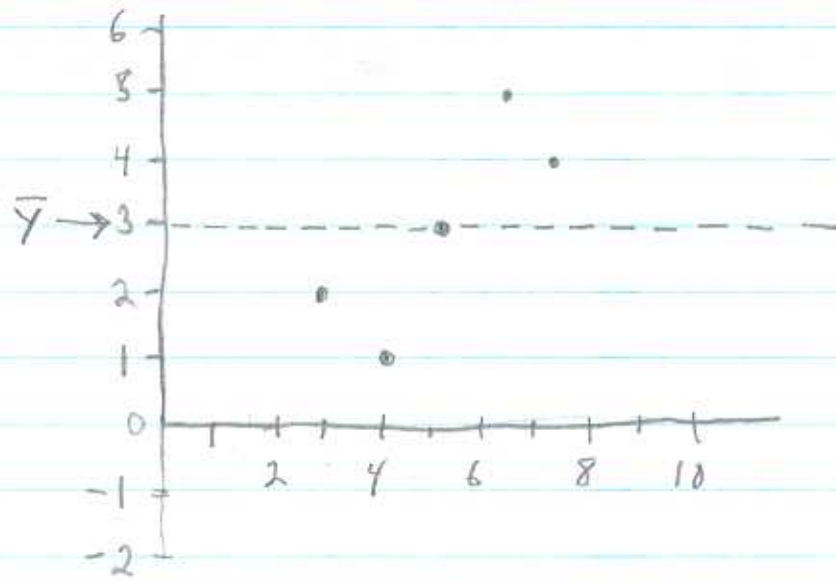
Regression Example

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$$\bar{X} = 5$$

$$\bar{Y} = 3$$

<u>X</u>	<u>Y</u>
3	2
4	1
5	3
6	5
7	4



Deviations

<u>X</u>	<u>\bar{X}</u>	<u>$(X - \bar{X})$</u>	<u>$(X - \bar{X})^2$</u>	<u>Y</u>	<u>\bar{Y}</u>	<u>$(Y - \bar{Y})$</u>	<u>$(Y - \bar{Y})^2$</u>
3	5	-2	4	2	3	-1	1
4	5	-1	1	1	3	-2	4
5	5	0	0	3	3	0	0
6	5	1	1	5	3	2	4
7	5	2	4	4	3	1	1
$\sum \sum_x = 10 \quad s^2 = 2$				$\sum \sum_y = 10 \quad s^2 = 2$			

<u>$(X - \bar{X})$</u>	<u>$(Y - \bar{Y})$</u>	<u>cross products</u>
-2	-1	2
-1	-2	2
0	0	0
1	2	2
2	1	2
$\sum P_{xy} = 8$		

Regression Example

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$$r = \sqrt{\frac{(SP_{xy})^2}{(SS_x)(SS_y)}} = \sqrt{\frac{64}{100}} = \sqrt{.64} = .80$$

Regression Line

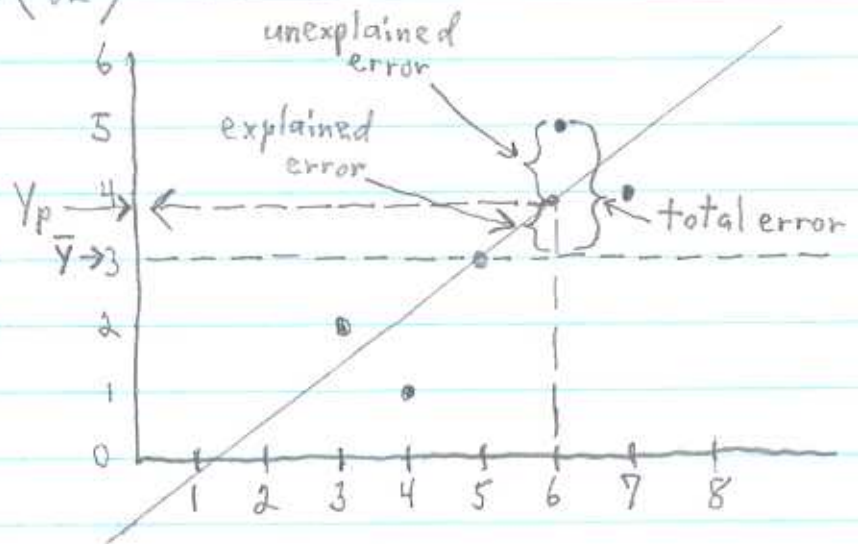
SLOPE: $b = r \left(\frac{S_x}{S_y} \right) = .80 \left(\frac{\sqrt{2}}{\sqrt{2}} \right) = .80$

INT.: $a = \bar{Y} - b\bar{X}$

$$a = 3 - .80(5)$$

$$a = 3 - 4$$

$$a = -1$$



Predicted Scores

$$y' = -1 + .8(X)$$

X	Y'
3	1.4
4	2.2
5	3
6	3.8
7	4.6

$$-1 + .8(3) = -1 + 2.4 = 1.4$$

$$-1 + .8(6) = -1 + 4.8 = 3.8$$

Regression Example

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Variances: $S_y^2 = S_{\text{Reg}}^2 + S_{\text{Err}}^2$

TOTAL = Exp. + Unexplained (Residual Error)

Total	Y	\bar{Y}	$(Y - \bar{Y})$	$(Y - \bar{Y})^2$
	2	3	-1	1
	1	3	-2	4
	3	3	0	0
	5	3	2	4
	4	3	1	1

$SS_y = 10$ $S_y^2 = 2$

Residual
(unexplained)

X	Y	Y'	$(Y - Y')$	$(Y - Y')^2$
3	2	1.4	.6	.36
4	1	2.2	-1.2	1.44
5	3	3	0	0
6	5	3.8	1.2	1.44
7	4	4.6	-.6	.36

$SS_{\text{res}} = 3.6$ $S_{\text{err}}^2 = .72$ $S_{\text{err}} = .849$

Regression
(explained)

Y'	\bar{Y}	$(Y' - \bar{Y})$	$(Y' - \bar{Y})^2$
1.4	3	-1.6	2.56
2.2	3	-.8	.64
3	3	0	0
3.8	3	.8	.64
4.6	3	1.6	2.56

6.4 $S_{\text{reg}}^2 = 1.28$

Regression Example 4 of 4

$$r^2 = \frac{\text{explained var.}}{\text{total var.}} = \frac{1.28}{2} = .64$$

$$r = .80$$

S_{err}

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

$$= \sqrt{2} \sqrt{1 - .64}$$

$$= \sqrt{2} \sqrt{.36}$$

$$= (1.414)(.60)$$

$$= .8485$$