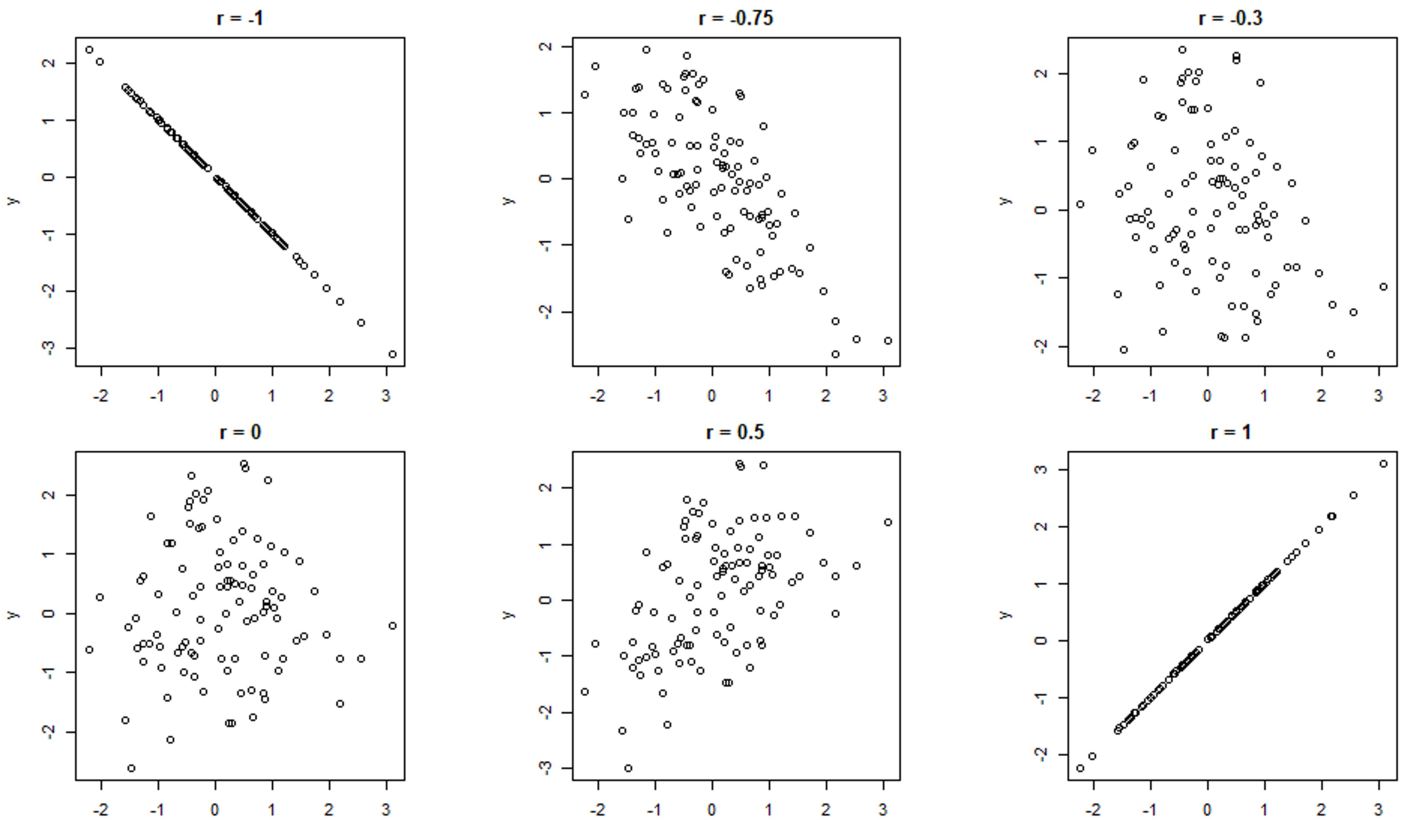
C1 - 10



Intuitively, I can make sense of the correlation as a measure of how much 2 variables are related to each other linearly. Therefore, using this intuition, we can see that when the correlation of the variables is 0, the scatterplot seems completely random, whereas as the value get closer to -1 or 1, the points on the scatterplot seem to converge into the form of a line.

Date........
Page.....

C2-10

	y_i	x_i	$y_i-\bar{y}$	$x_i-\bar{x}$	$(y_i-\bar{y})(x_i-\bar{x})$	$(y_i-\bar{y})^2$
	7	0	3	-2.5	-7.5	9
	5	1	1	-1.5	-1.5	1
	5	2	1	-0.5	-0.5	1
	4	3	0	0.5	0	0
	2	4	-2	1.5	-3.0	4
	1	5	-3	2.5	-7.5	9
SUM	24	15			-20	24

$\bar{y} \to 4 \qquad \bar{x} \to 2.5$

$cov(x,y) = -20/5 = -4 \qquad var(x) = 24/5 = 4.8$

$$\hat{\beta} = \frac{cov(x,y)}{var(y)} = -\frac{4.5}{\cancel{24}\,6} = -\frac{5}{6}$$

$$\hat{\alpha} = \bar{x} - \hat{\beta}\bar{y} = 2.5 + \frac{5}{\cancel{6}3}\cdot 4 \Rightarrow \frac{5}{2} + \frac{5}{3} = \frac{25}{6}$$

$$\hat{x}_i = \hat{\alpha} - \hat{\beta}\hat{y}_i = \frac{25}{6} + \frac{5}{6}y_i$$

Clearly, this is not the same line as $y_i = \frac{48}{7} - \frac{8}{7}x_i$ since the product of their slopes is not 1.

Square root of product of slopes $= \sqrt{-\frac{8}{7}\cdot\frac{5}{6}}$

(*) This is an imaginary number since it is the square root of a negative number.