Problema 1 - Correlación de Pearson

$$r = \frac{\Sigma (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Sigma (x_i - \bar{x})^2 \, \Sigma (y_i - \bar{y})^2}}$$

$\bar{x} = 7.1$

$\bar{y} = 7.5$

$(x_i - \bar{x}) = -2.1, 0.9, -3.1, 2.9, -0.1, 1.9$

$(y_i - \bar{y}) = -0.5, 0.5, -1.5, 1.5, -0.5, 0.5$

$(x_i - \bar{x})(y_i - \bar{y})$ 1.05, 0.45, 4.65, 4.35, 0.05, 0.95 $= \Sigma \Rightarrow 11.5$

$(x_i - \bar{x})^2 = 4.41, 0.81, 9.61, 8.41, 0.01, 3.61 = 26.86$

$(y_i - \bar{y})^2 = 0.25, 0.25, 2.25, 2.25, 0.25, 0.25 = 5.5$

$\Sigma_x \, \Sigma_y = 147.73 = 12.15$

$r = \frac{11.5}{12.5}$

Problema 2 - Correlación de Pearson

$(x_i - \bar{x}) = -2.5, -0.5, -1.5, 1.5, 0.5, 2.5$

$(y_i - \bar{y}) = -20.83, -0.83, -5.83, 9.17, 4.17, 14.17$

$\bar{x} = 12.5$

$\bar{y} = 220.83$

$(x_i - \bar{x})(y_i - \bar{y}) = 52.075, 0.415, 8.745, 13.755, 2.085, 35.425 = \Sigma 112.5$

$(x_i - \bar{x})^2 = 6.25, 0.25, 2.25, 2.25, 0.25, 6.25 = 17.5$

$(y_i - \bar{y})^2 = 433.88, 0.6889, 33.98, 84.08, 17.38, 200.78 = 770.78$

$\Sigma_x \, \Sigma_y = 13.448.65 = 115.96$

$r = \frac{112.5}{115.96}$

Problema 3 - Chi - Cuadrado

$$X^2 = \sum [(O_i + E_i)^2$$

$$E = \frac{\text{Total fila} \times \text{total col}}{\text{Total general}}$$

$$E_1 = \frac{(25)(33)}{70} = \frac{825}{70} = 11.78$$

$$E_2 = \frac{(25)(37)}{70} = \frac{925}{70} = 13.21$$

$$E_3 = \frac{(20)(33)}{70} = \frac{660}{70} = 9.42$$

$$E_4 = \frac{(20)(37)}{70} = \frac{740}{70} = 10.57$$

$$E_5 = \frac{(25)(33)}{70} = \frac{825}{70} = 11.78$$

$$E_6 = \frac{(25)(37)}{70} = \frac{925}{70} = 13.21$$

Problema 5 - Regresión Lineal

$\hat{y} = \beta_0 + \beta_1 x$

$\beta_1 = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2}$

$\bar{x} = 7.1$

$\bar{y} = 7.5$

$\beta_0 = \bar{y} - \beta_1 \bar{x}$

x	y	$x_i - \bar{x}$	$y_i - \bar{y}$	$(x_i - \bar{x})(y_i - \bar{y})$	$(x_i - \bar{x})^2$	$(y_i - \bar{y})^2$
5	7	-2.1	-0.5	1.05	4.41	0.25
8	8	0.9	0.5	0.45	0.81	0.25
4	6	-3.1	-1.5	4.65	9.61	2.25
10	9	2.9	1.5	4.35	8.41	2.25
7	7	-0.1	-0.5	0.05	0.01	0.25
9	8	1.9	0.5	0.95	3.61	0.25
				11.5	26.86	5.5

$\beta_1 = \frac{11.5}{26.86} = 0.4281$

$\beta_0 = 7.5 - (0.4281)(7.1)$

$\beta_0 = 7.5 - 3.03 = 4.47$

$\hat{y} = 4.47 + 0.4281 x$

x	y	$\hat{y}_i$	$y_i - \hat{y}_i$	$(y_i - \hat{y}_i)^2$
5	7	6.61	0.39	0.15
8	8	7.89	0.11	0.01
4	6	6.18	-0.18	0.03
10	9	8.75	0.25	0.06
7	7	7.46	-0.46	0.21
9	8	8.32	-0.32	0.10
				$\sum$ 0.56

$R^2 = 1 - \frac{0.56}{5.5}$

$R^2 = 1 - 0.10$

$R^2 = 0.9$

A medida que capacitan más a los empleados es mayor la satisfacción del cliente.

Relación positiva

Prolelema 6 - Regresión lineal

X	y	$x_i-\bar{x}$	$y_i-\bar{y}$	$(x_i-\bar{x})(y_i-\bar{y})$	$(x_i-\bar{x})^2$	$(y_i-\bar{y})^2$
10	200	-2.5	-20.83	52.075	6.25	433.88
12	220	-0.5	-0.83	0.415	0.25	0.6889
11	215	-1.5	-5.83	8.745	2.25	33.98
14	230	1.5	9.17	13.755	2.25	84.08
13	225	0.5	4.17	2.085	0.25	17.38
15	235	2.5	14.17	35.425	6.25	200.78
				$\sum$ 112.55	17.5	770.78

$\bar{x} = 12.5$

$\bar{y} = 220.83$

$B_1 = \frac{112.55}{17.5} = 6.4314$

$B_0 = 220.83 - (6.4314)(12.5)$

$B_0 = 220.83 - 80.3925 = 140.4375$

$\hat{y} = 140.4375 + 6.4314x$

x	y	$\hat{y}_i$	$y_i-\hat{y}_i$	$(y_i-\hat{y}_i)^2$
10	200	204.7515	-4.7515	22.57
12	220	217.6743	2.3257	5.69
11	215	211.1829	3.8171	14.57
14	230	230.4771	-0.4771	0.22
13	225	224.0457	0.9543	0.91
15	235	236.9085	-1.9085	3.64
				$\sum$ 47.6

$R^2 = 1 - \frac{47.6}{770.78}$

$R^2 = 1 - 0.06$

$R^2 = 0.94$

Relación positiva

A medida que contratan a más