Nombre del alumno:

Karla Susana Almaraz Santiz.

Nombre del profesor:

Luis Enrique Meneses Wong.

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Problema 1 - Correlación de Pearson

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

$(x_i - \bar{x}) = -2.1, 0.9, -3.1, 2.9, -0.1, 1.9$
$(y_i - \bar{y}) = +0.5, 0.5, -1.5, 1.5, -0.5, 0.5$

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

$(x_i - \bar{x})^2 = 4.41, 0.81, 9.61, 8.41, 0.01, 3.61 = 26.86$
$(y_i - \bar{y})^2 = 0.25, 0.25, 2.25, 2.25, 0.25, 0.25 = 5.5$

$\Sigma x \Sigma y = 147.73 = 12.15$ $\quad r = \frac{11.5}{12.15} = 0.94$ $\quad \frac{11.5}{0.94} = \frac{12.25}{}$

Entre mas aumento de capacitación, más satisfacción al cliente. Correlación fuerte

Problema 2 - Correlación de Pearson

$(x_i - \bar{x}) = -2.5, -0.5, -1.5, 0.5, 2.5$
$(y_i - \bar{y}) = -20.83, -0.83, -5.83, 9.17, 4.17, 11.17$
$\bar{x} = 12.5$
$\bar{y} = 220.83$
$(x_i - \bar{x})(y_i - \bar{y}) = 52.075, 0.415, 8.745, 13.755, 2.085, 35.425$
$\Sigma = 112.5$

$(x_i - \bar{x})^2 = 6.25, 0.25, 2.25, 2.25, 0.25, 6.25 = 17.5$
$(y_i - \bar{y})^2 = 433.88, 0.6889, 33.98, 84.08, 17.38, 200.98 = 770.78$
$\Sigma x \Sigma y = 13.498.65 = 115.96$
$r = \frac{112.5}{115.96} = 0.97$ $\quad \frac{112.5}{0.97} = 115.97$

Correlación fuerte
A medida que se contratan mas empleados aumenta la producción.

Problema 3 - Chi cuadrada -

$$x^2 = \Sigma (O_i + E_i)^2 \qquad E_i = \frac{\text{tot. fila} \times \text{tot. col.}}{\text{tot. gral.}}$$

$E_1 = \frac{(25)(33)}{70} = \frac{825}{70} = 11.78$ $\quad 15 - 11.78 = 3.22^2 = 10.$

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

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

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

$E_5 = \frac{(25)(33)}{70} = \frac{825}{70} = 11.78$ $\quad \alpha = 0.05$
$x^2 = 2.55$

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

$15 - 11.78 = 3.22^2 = 10.36 / 11.78 = 0.87$
$8 - 9.42 = (-1.42)^2 = 2.01 / 9.42 = 0.21$
$10 - 11.78 = (-1.78)^2 = 3.16 / 11.78 = 0.26$
$10 - 13.21 = (-3.21)^2 = 10.30 / 13.21 = 0.78$
$12 - 10.57 = 1.43^2 = 2.04 / 10.57 = 0.19$
$15 - 13.21 = 1.79^2 = 3.20 / 13.21 = 0.24$

$x^2 = \frac{2.55}{5.991} = 0.42$

Grados de libertad
$3 - 1 = 2 \quad 2 - 1 = 1 \quad 2 \times 1 =$
$x^2 = 5.991 =$ Valor crítico

No hay relación entre el dato al que pertenece el trabajador con el curso precencial o en línea.

Problema 4 - Chi cuadrada.

	Inc	Sat.	Ins.	Tot
Económico	20	5	25	
Tiempo L.	10	15	25	
total	30	20	50	

E.5
$\frac{(25)(30)}{50} = 15$

E.1
$\frac{(25)(20)}{50} = 10$

T.S.
$\frac{(25)(30)}{50} = 15$

T.I
$\frac{(25)(20)}{50} = 10$

$20-15 = S^2 = 25/15 = 1.6$
$5-10 = (-5)^2 = 25/15 = 2.5$
$10-15 = (-5)^2 = 25/15 = 1.6$
$15-10 = 5^2 = 25/15 = 2.5$
$X^2 = 8.2$

$\alpha = 0.05$
G.L
$(2-1)(2-1) = 1$ $X^2 = 1$
$x^2 = 3.84$ = Valor crítico

$X^2 = \frac{8.2}{3.84} = 2.13$ ✓

Hay mucha relación entre el incentivo y la satisfacción laboral de los empleados.

Problema 5 - Regresion lineal

$\hat{Y} = B_0 + B_1 X$

$B_1 = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2}$

$B_0 = \bar{y} - B_1 \bar{x}$

$\bar{x} = 7.1$
$\bar{y} = 7.5$

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
				$\Sigma 11.5$	$\Sigma 26.86$	$\Sigma 5.5$

$B_1 = \frac{11.5}{26.86} = 0.4281$

$B_0 = 7.5 - (0.4281)(7.1)$
$B_0 = 7.5 - 3.03 = 4.47$
$\hat{Y} = 4.47 + 0.4281 X$

$\hat{Y}$	$y_i - \hat{y}$	$(y_i - \hat{y})^2$
6.61	0.39	0.15
7.89	0.11	0.01
6.18	-0.18	0.03
8.75	0.25	0.06
7.46	-0.46	0.21
8.32	-0.32	0.10
		$\Sigma 0.56$

$R_1 = \frac{5.56}{5.5}$

$R^2 = 1 - 0.10$
$R = 0.9$ ✓

Relación Positiva (+)
A medida que hay mas capacitación en empleados es mayor la satisfacción al cliente.

Problema 6 - Regresión lineal

$\bar{X} = 12.5$ $\bar{Y} = 220.83$

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	84.04
13	225	0.5	4.17	2.085	0.25	17.38
15	235	2.5	14.17	35.425	6.25	200.78
				$\Sigma = 112.55$	$\Sigma = 17.5$	$\Sigma = 770.78$

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

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

$$B_0 = 20.83 - 80.3925 = 140.4375$$

$$\hat{Y} = 140.4375 + 6.4314X$$

$\hat{y}_i$	$y_i - \hat{y}_i$	$(y_i - \hat{y}_i)^2$
204.7515	-4.7515	22.57
217.6143	2.3857	5.69
211.1829	3.8171	14.57
230.4771	-0.4771	0.22
224.0457	6.9543	0.91
236.9085	-1.9085	3.64
		$\Sigma = 47.6$

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

$$R^2 = 1 - 0.06$$

$$R^2 = 0.94$$

Relación Positiva

Cuando contratan a más empleados hay mayor eficiencia y producción