# UNIVERSIDAD DEL SURESTE UDS.

LICENCIATURA EN NUTRICIÓN

ESTADÍSTICA INFERENCIAL.

## EJERCICIOS EN CLASE.

Docente: Víctor Antonio Gonzalez Salas

Alumna: Josseline Sarahi Cerdio Zepeda

CUARTO CUATRIMESTRE.

NOVIEMBRE, 2023.

# EJERCICIOS DE FACTOR DE CORRELACIÓN Y REGRESIÓN LINEAL.

① Cinco niños de 2, 3, 5, 7 y 8 años de edad pesan respectivamente, 14, 20, 32, 42 y 44 kilos.
- Hallar la ecuación de la recta de regresión de la edad sobre el peso.
- Cuál sería el peso aprox. de un niño de 6 años.

| X | Y | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|
| 2 | 14 | 28 | 4 | 196 |
| 3 | 20 | 60 | 9 | 400 |
| 5 | 32 | 160 | 25 | 1024 |
| 7 | 42 | 294 | 49 | 1764 |
| 8 | 44 | 352 | 64 | 1936 |
| 25 | 152 | 894 | 151 | 5,320 |

$$SCX = \sum X^2 - \frac{(\sum X)^2}{n} = 151 - \frac{(25)^2}{5}$$

$$SCY = \sum Y^2 - \frac{(\sum Y)^2}{n} = 5,320 - \frac{(152)^2}{5}$$

$$SCXY = \sum XY - \frac{(\sum X)(\sum Y)}{n} = 894 - \frac{(25)(152)}{5}$$

$SCXY = 134$

$$r = \frac{SCXY}{\sqrt{(SCX)(SCX)}}$$

$$r = \frac{134}{\sqrt{(26)(700)}}$$

$r = 0.99$

fuerte +

$SCX = 26$

$SCY = 700$

$SCXY = 134$

$r = 0.99$

# Regresión lineal

$\hat{X} = 1$ año
$\hat{Y} = 50k.$

① $b1 = \frac{SCXY}{SCX} = 5.15$ 25/5

② $\bar{X} = 5$ $\bar{Y} = 30.4$ 152/5

③ $b0 = \bar{Y} - b1 * \bar{X} = b0 = 4.65$ $30.4 - 5.15 * 5$

④ $MRL = \hat{Y} = b0 + b1 * \hat{X}$

$\hat{Y} = 4.65 + 5.15 * 1$

$4.65 + 5.15 = 9.8 = \hat{Y}$ kg.

⑤ $MRL\hat{X} = \frac{\hat{Y} - b0}{b1}$ $\hat{X} = \frac{50 - 4.65}{5.15}$

$\hat{X} = \frac{45.35}{5.15}$

$\hat{X} = 8.80$ Años

② Un centro comercial sabe en función de la distancia, en Km, a la que se sitúe de un núcleo de población, acuden los clientes, en ciertos que figuran en la tabla.

| Nº de clientes (x) | Distancia (Y) |
|---|---|
| 8 | 15 |
| 7 | 19 |
| 6 | 25 |
| 4 | 23 |
| 2 | 34 |
| 1 | 40 |

1- Calcular el coeficiente de correlación lineal

2- Si el centro comercial se sitúa a 2 Km. ¿Cuántos clientes puede esperar?

3- Si desea recibir a 5 clientes, ¿a que distancia del núcleo de pobl. debe situarse?

| X | Y | XY | $x^2$ | $y^2$ |
|---|---|---|---|---|
| 8 | 15 | 120 | 64 | 225 |
| 7 | 19 | 133 | 49 | 361 |
| 6 | 25 | 150 | 36 | 625 |
| 4 | 23 | 92 | 16 | 529 |
| 2 | 34 | 68 | 4 | 1156 |
| 1 | 40 | 40 | 1 | 1600 |
| 28 | 156 | 603 | 170 | 4496 |

① De $X = SCX = \Sigma \frac{(X)^2}{n} = \frac{28^2}{6} = \frac{784}{6} = 130.66$

$170.66 - 130.66 =$
$39.34 = SCX$

② De $y = \Sigma y^2 - \frac{(y^2)}{n} = \frac{156^2}{6}$

$\frac{24,336}{6} = 4056$

$4496 - 4056 = 440$ SCY

③ $"XY" = \frac{\Sigma XY - (\Sigma X) * (\Sigma Y)}{n} = \frac{(28)(156)}{6}$

$603 - 728 = -125 = SCXY$

$$r = \frac{SCXY}{\sqrt{(SCX)(SCXY)}} = \frac{-125}{\sqrt{(39.34)(440)}} = \frac{-125}{\sqrt{17,309.6}}$$

$$\frac{-125}{131.56} = -0.95 = \text{factor de correlacion}$$

Regresion lineal

(1) $b1 = \frac{SCXY}{SCX} = \frac{-125}{39.34} = -3.17 = B1$

(2) $\bar{X} = 4.66$ $\bar{Y} = 26$

(3) $b0 = \hat{Y} - b1 * \bar{x} = b0 = 26 - (-3.17) * 4.66$

$26 - (-14.77) = 40.77 = B0$

(4) $MRL\hat{Y} = B0 + B1 * \hat{X} = 40.77 + (-3.17)(5)$

$40.77 + (-15.85) = 24.92$

(5) $MRL\hat{X} = \frac{Y - b0}{b1} = \frac{2 - 40.77}{(-3.17)} = \frac{(-38.77)}{(-3.17)}$

12.23 Clientes por esperar

3) las notas obtenidas, por cinco alumnos en matemáticas son

1) Mate. Química

| X | Y | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|
| 6 | 6.5 | 39 | 36 | 42.25 |
| 4 | 4.5 | 18 | 16 | 20.25 |
| 8 | 7 | 56 | 64 | 49 |
| 5 | 5 | 25 | 25 | 25 |
| 3.5 | 4 | 14 | 12.25 | 16 |
| 2) 26.5 | 27 | 152 | 153.25 | 152.5 |

$$SCX = \sum X^2 - \frac{(\sum X)^2}{n} = 12.8$$

$$\frac{702.25}{5} = 140.45$$

$$153.25 - 140.45 = 12.8$$

$$SCY = \sum y^2 - \frac{(\sum y)^2}{n}$$

$$\frac{729}{5} = 145.8$$

$$152.5 - 145.8 = 6.7$$

$$SCXY = \sum xy - \frac{(\sum x)(\sum y)}{n}$$

$$SCXY = 152 - \frac{26.5 * 27}{5}$$

$$152 - \frac{715.5}{5}$$

$$152 - 143.1$$

$$SCXY = 8.9$$

$$r = \frac{SCXY}{\sqrt{(SCX)(SCY)}} = \frac{8.9}{\sqrt{12.8 \times 6.7}} = \frac{8.9}{9.26}$$

$$85.76$$

$r = 0.96$ + fuerte

Datos obtenidos:

$SCX = 12.8$

$SCY = 6.7$

$SCXY = 8.9$

1. $b1 = \frac{8.9}{12.8} = 0.6953$

$\bar{X} = 26.5 / 5 = \bar{X} = 5.3$

$\bar{Y} = 27/5 = \bar{Y} = 5.4$

$b0 = 5.4 - 0.6953 * 5.3$

$b0 = 5.4 - 3.68509$

$b0 = 1.71491$

$MRL\hat{Y} = b0 + b1 * \hat{X}$

$MRL\hat{Y} = 1.73 + 0.69 * 3$ cuando mayo

$MRL\hat{Y}$ $\boxed{3.82}$

aun

$*$

$\div$

$+$

$-$

$MRL\hat{X} = \frac{\hat{Y} - b0}{b1}$

$MRL\hat{X} = \frac{8 - 60}{b1}$

$\frac{-52}{0.69}$

$-75.36$

⑤ Las estaturas y pesos de 10 jugadores de baloncesto son:

| Estatura X | Peso Y | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|
| 186 | 85 | 15810 | 34596 | 7225 |
| 189 | 85 | 16065 | 35721 | 7225 |
| 190 | 86 | 16340 | 36100 | 7396 |
| 192 | 90 | 17280 | 36864 | 8100 |
| 193 | 87 | 16791 | 37249 | 7569 |
| 193 | 91 | 17563 | 37249 | 8281 |
| 198 | 93 | 18414 | 39204 | 8649 |
| 201 | 103 | 20703 | 40209 | 10,609 |
| 203 | 100 | 20300 | 41209 | 10,000 |
| 205 | 101 | 20705 | 42025 | 10,201 |
| 1950 | 92 | 179,971 | 380,618 | 85,255 |

① Suma de cuadrados.

De "x" $= SCX = \frac{3802,500}{10}$ $\qquad \Sigma x^2 - \frac{\Sigma x^2}{n}$

$380,618 - 380,250 = 368\ SCX$

② De $y = \Sigma y^2 - \frac{(\Sigma y)^2}{n} = \frac{848,241}{10}$

$85,255 - 84,824.1 = 430.9\ SCY$

③ De $XY = \Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{n} = \frac{(1950)(921)}{10}$

$179,971 - 179,595 = 376\ SCXY$

$r = \frac{SCXY}{\sqrt{(SCX)(SCY)}} = \frac{376}{\sqrt{(368)(430.9)}} = \frac{376}{\sqrt{158,571.2}}$

$\frac{376}{398.20} = 0.94$ factor de correlación fuerte

Regresión lineal.

① $B1 = \frac{SCXY}{SCX} = \frac{376}{368} = 1.02\ B_1$

② $\bar{X} = 195$ $\bar{Y} = 92.1$

③ $B0 = Y - b1 * \bar{X} = 92.1 - (1.02)(195)$

$92.1 - 198.9 = -106.8\ B0$

④ $MRL\hat{Y} = B0 + B1 * \hat{X} = (-106.8) + (102)(208)$

$(-106.8) + (212.16 = 105.36$ peso kg

⑥ A partir de los sig. datos referentes a horas trabajadas en un taller (x) y a unidades producidas (Y). Determinar la recta de regresión de Y sobre X, el coeficiente de correlación lineal e interpretarlo.

| horas (x) | Producción (Y) | XY | $X^2$ | $Y^2$ |
|---|---|---|---|---|
| 80 | 300 | 24000 | 6400 | 90,000 |
| 79 | 302 | 23858 | 6241 | 91,204 |
| 83 | 315 | 26145 | 6889 | 99,225 |
| 84 | 330 | 27720 | 7056 | 108,900 |
| 78 | 300 | 23400 | 6084 | 90,000 |
| 60 | 250 | 15000 | 3600 | 62,500 |
| 82 | 300 | 24000 | 6724 | 90,000 |
| 85 | 340 | 28900 | 7225 | 115,600 |
| 79 | 315 | 24885 | 6241 | 99,225 |
| 84 | 330 | 27720 | 7056 | 108,900 |
| 80 | 310 | 24800 | 6400 | 96100 |
| 62 | 240 | 14880 | 3844 | 57,600 |
| 936 | 3632 | 285,908 | 73,760 | 1,109,254 |

① $X = SCX = \Sigma X^2 - \frac{(\Sigma X)^2}{n} = \frac{876,096}{12} = 73008$

$73,700 - 73,008 = 752\ SCX$

② De "Y" $= SCX = \Sigma y^2 - \frac{(\Sigma y)^2}{n} = \frac{13,191,424}{12}$

$1,109,254 - 1,099,285.33 = 9,968.67\ SCY$

③ De $xy = \Sigma XY - \frac{(\Sigma x)(\Sigma y)}{} - \frac{(936)(3,632)}{12}$

$285,908 - 283,296 = 2,612\ SCXY$

$r = \frac{SCXY}{\sqrt{(SCX)(SCY)}}$

$r = \frac{2,612}{\sqrt{(752)(9,968.67)}} = \frac{2,612}{\sqrt{7,496,439.84}}$ →

$\frac{2612}{2,737.96} = 0.95$ factor de correlación fuerte

Regresion lineal

① $B1 = \frac{SCXY}{SCX} = \frac{2612}{752} = 3.47$ B1

② $X = 78$ $Y = 302.66$

③ $B0 = \bar{Y} - b1 * \bar{X} = 302.66 - (3.47)(78)$

$302.66 - 270.66 = 32$ B0