

Lista-4

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1 Questão 01

$$S_x = 30$$

$$S_y = 11240$$

$$S_x^2 = 128$$

$$S_y^2 = 20353600$$

$$S_{xy} = 50480$$

1.1 Item A

$$S_{xx} = n\Sigma x^2 - (\Sigma x)^2$$

$$S_{xx} = 8 \cdot 128 - 900$$

$$S_{xx} = 1024 - 900$$

$$S_{xx} = 124$$

$$S_{yy} = n\Sigma y^2 - (\Sigma y)^2$$

$$S_{yy} = 8 \cdot 20353600 - 126337600$$

$$S_{yy} = 162828800 - 126337600$$

$$S_{yy} = 36491200$$

$$S_{xy} = n\Sigma xy - (\Sigma x)(\Sigma y)$$

$$S_{xy} = 8 \cdot 50480 - 337200$$

$$S_{xy} = 403840 - 337200$$

$$S_{xy} = 66640$$

$$\text{Corr}(x, y) = \frac{S_{xy}}{\sqrt{S_{xx} \cdot S_{yy}}} = \frac{66640}{\sqrt{124 \cdot 36491200}} = \frac{66640}{67267} = 0,9907$$

Resultado: Forte correlação positiva

1.2 Item B

$$\hat{\beta} = \frac{S_{xy}}{S_{xx}} = \frac{66640}{124} = 537,42$$

$$\hat{\beta} = \bar{y} - \hat{\beta} * \bar{x} = 1405 - 537,42 * 3,75 = -610,325$$

1.2.1 Resultados e Analises

$\hat{\beta}_0$: Não possui um análise pratica

$\hat{\beta}_1$: Vocabulário medio de cada criança vem aumentando 537,42 palavras a cada ano

1.3 Item C

$$R^2 = (0,9907)^2 = 0.9815 \text{ ou } 98.15\%$$

1.3.1 Resultado

Podemos entende que 98,15% da palavras no vocabulário de uma criança depende da idade, já os outros 1,85%, muito provavelmente vem de erros ou outras variável não aborada no estudo

1.4 Item D

$$Se = \sqrt{\frac{\Sigma y^2 - \hat{\beta} \Sigma y - \hat{\beta}^2 \Sigma xy}{n-2}}$$

$$Se = \sqrt{\frac{20353600 - (610,325 * 11240) + (537,42 * 50480)}{6}}$$

$$Se = \sqrt{\frac{84691,4}{6}}$$

$$Se = 118,81$$

$$\hat{y} = \hat{B}_0 + \hat{B}_1 * n = -610,325 + 537,42 * 7 = 3151,615$$

$$Ic(95\%) = \hat{y} + t_{\frac{\alpha}{2}}; n-2 * Se * \sqrt{1 + \frac{1}{n} + \frac{N(x_0 - \bar{x})^2}{S_{xx}}}$$

$$Ic(95\%) = 3151,615 \pm 2,4469 * (118,81 * \sqrt{1 + \frac{1}{8} + \frac{8(7-3,75)^2}{124}})$$

$$Ic(95\%) = 3151,615 \pm 390,73$$

$$Ic(95\%) = [2760,885; 3542,345]$$

1.5 Item E

$$IC(95\%) = \hat{y} \pm t_{\frac{\alpha}{2}}; n-2 * Se * \sqrt{\frac{1}{n} + \frac{n(n_0 - \bar{x})^2}{S_{xx}}}$$

$$Ic(95\%) = 3151,615 \pm 2,4469 * (118,81 * \sqrt{\frac{1}{8} + \frac{8(7-3,75)^2}{124}})$$

$$Ic(95\%) = 3151,615 \pm 261,07$$

$$Ic(95\%) = [2890,545; 3412,685]$$

2 Questão 02

$$Sx = 60$$

$$Sy = 891$$

$$S^2 = 346$$

$$Sy^2 = 65451$$

$$Sxy = 4620$$

Item A

$$\begin{aligned}S_{xx} &= n\Sigma x^2 - (\Sigma x)^2 \\S_{xx} &= 13 * 346 - (60)^2 \\S_{xx} &= 4498 - 3600 \\S_{xx} &= 898\end{aligned}$$

$$\begin{aligned}S_{yy} &= n\Sigma y^2 - (\Sigma y)^2 \\S_{yy} &= 13 * 65451 - (891)^2 \\S_{yy} &= 850863 - 793881 \\S_{yy} &= 56982\end{aligned}$$

$$\begin{aligned}S_{xy} &= n\Sigma xy - (\Sigma x)(\Sigma y) \\S_{xy} &= 13 * 4620 - (60)(891) \\S_{xy} &= 60060 - 53460 \\S_{xy} &= 6600\end{aligned}$$

$$Corr(x, y) = \frac{S_{xy}}{\sqrt{S_{xx} * S_{yy}}} = \frac{6600}{\sqrt{898 * 56982}} = \frac{6600}{51169836} = \frac{6600}{7153,30} = 0,9226$$

Resultado: Fonte correlação positiva

2.1 Item B

$$\begin{aligned}\hat{\beta} &= \frac{S_{xy}}{S_{xx}} = \frac{66640}{898} = 7,35 \\ \hat{\beta} &= \bar{y} - \hat{\beta} * \bar{x} = 68,54 - 7,35 * 4,62 = 34,58\end{aligned}$$

2.1.1 Resultados e Analises

$\hat{\beta}_0$: Ao alunos que possuem zero hora de estudo a media de nota esperada é 34,58 pontos

$\hat{\beta}_1$: A cada hora de estudo adicional, a media de pontos do aluno aumenta 7,35

2.2 Item C

$$R^2 = (0,9907)^2 = 0,9812 \text{ ou } 85,12\%$$

2.2.1 Resultado

Podemos atribuir 85,12% da variabilidade na pontuação do teste as horas de estudo, já os outros 14,88% são

2.3 Item D

$$Se = \sqrt{\frac{\Sigma y^2 - \hat{\beta} \Sigma y - \hat{\beta}^2 \Sigma xy}{n-2}}$$

$$Se = \sqrt{\frac{x - (x * x) + (x * x)}{x}}$$

$$Se = \sqrt{\frac{x}{x}}$$

$$Se = x$$

$$\hat{y} = \hat{B}0 + \hat{B}1 * n = -610,325 + 537,42 * 7 = 3151,615$$

$$Ic(95\%) = \hat{y} + t_{\frac{\alpha}{2}}; n - 2 * Se * \sqrt{1 + \frac{1}{n} + \frac{N(x_0 - x)^2}{N(x_0 - x)^2}}$$

$$Ic(95\%) = 3151,615 \pm 2,4469 * (118,81 * \sqrt{1 + \frac{1}{8} + \frac{8(7-3,75)^2}{124}})$$

$$Ic(95\%) = 3151,615 \pm 390,73$$

$$Ic(95\%) = [2760,885; 3542,345]$$

2.4 Item E

$$IC(95\%) = \hat{y} \pm t_{\frac{\alpha}{2}}; n - 2 * Se * \sqrt{\frac{1}{n} + \frac{n(n_0 - x)}{S_{xx}}}$$

$$Ic(95\%) = 3151,615 \pm 2,4469 * (118,81 * \sqrt{\frac{1}{8} + \frac{8(7-3,75)^2}{124}})$$

$$Ic(95\%) = 3151,615 \pm 261,07$$

$$Ic(95\%) = [2890,545; 3412,685]$$

3 Questão 03

Item A

$$S_{xx} = n\Sigma x^2 - (\Sigma x)^2$$

$$S_{xx} =$$

$$S_{xx} =$$

$$S_{xx} =$$

$$S_{yy} = n\Sigma y^2 - (\Sigma y)^2$$

$$S_{yy} =$$

$$S_{yy} =$$

$$S_{yy} =$$

$$S_{xy} = n\Sigma xy - (\Sigma x)(\Sigma y)$$

$$S_{xy} =$$

$$S_{xy} =$$

$$S_{xy} =$$

$$Corr(x, y) = \frac{S_{xy}}{\sqrt{S_{xx} * S_{yy}}} = \frac{x}{\sqrt{x * x}} = \frac{x}{x} = x$$

Resultado: Fonte correlação positiva

3.1 Item B

$$\hat{\beta} = \frac{S_{xy}}{S_{xx}} = \frac{66640}{124} = 537,42$$

$$\hat{\beta} = \bar{y} - \hat{\beta} * \bar{x} = 1405 - 537,42 * 3,75 = -610,325$$

3.1.1 Resultados e Analises

$$\hat{\beta}0:$$

$$\hat{\beta}1:$$

3.2 Item C

$$R^2 = (0,9907)^2 = 0,9815 \text{ ou } 98,15\%$$

3.2.1 Resultado

3.3 Item D

$$Se = \sqrt{\frac{\Sigma y^2 - \hat{\beta} \Sigma y - \hat{\beta}^2 \Sigma xy}{n-2}}$$

$$Se = \sqrt{\frac{x - (x*x)/x + (x*x)/x}{x}}$$

$$Se = \sqrt{\frac{x}{x}}$$

$$Se = x$$

$$\hat{y} = \hat{B}0 + \hat{B}1 * n = -610,325 + 537,42 * 7 = 3151,615$$

$$Ic(95\%) = \hat{y} \pm t_{\frac{\alpha}{2}}; n-2 * Se * \sqrt{1 + \frac{1}{n} + \frac{N(x_0-x)^2}{n}}$$

$$Ic(95\%) = 3151,615 \pm 2,4469 * (118,81 * \sqrt{1 + \frac{1}{8} + \frac{8(7-3,75)^2}{124}})$$

$$Ic(95\%) = 3151,615 \pm 390,73$$

$$Ic(95\%) = [2760,885; 3542,345]$$

3.4 Item E

$$IC(95\%) = \hat{y} \pm t_{\frac{\alpha}{2}}; n-2 * Se * \sqrt{\frac{1}{n} + \frac{n(n_0-x)}{Sxx}}$$

$$Ic(95\%) = 3151,615 \pm 2,4469 * (118,81 * \sqrt{\frac{1}{8} + \frac{8(7-3,75)^2}{124}})$$

$$Ic(95\%) = 3151,615 \pm 261,07$$

$$Ic(95\%) = [2890,545; 3412,685]$$

3.5 Item D

$$Se = \sqrt{\frac{\Sigma y^2 - \hat{\beta} \Sigma y - \hat{\beta}^2 \Sigma xy}{n-2}}$$

$$Se = \sqrt{\frac{70836 - (93,97*908) + (4,07*3724)}{10}}$$

$$Se = \sqrt{\frac{667,92}{10}}$$

$$Se = 8,17$$