Statistik Aufgaben 2 13.10.2010

A

1.) ⓐ $\bar{x} = \left(\frac{0+2+3+5}{4}\right) = \frac{10}{4} \hat{=} \frac{5}{2}$, $\bar{y} = \left(\frac{8+3+1-2}{4}\right) = \frac{5}{2}$

$E(X) = 0 \cdot \frac{1}{4} + 2 \cdot \frac{1}{4} + 3 \cdot \frac{1}{4} + 5 \cdot \frac{1}{4} = \frac{5}{2}$

$E(Y) = 8 \cdot \frac{1}{4} + 3 \cdot \frac{1}{4} + 1 \cdot \frac{1}{4} + (-2) \cdot \frac{1}{4} = \frac{5}{2}$

? oder $P(x)$?

$\frac{1}{n-1}$

$s_x^2 = VAR(X) = (0-\frac{5}{2})^2 \cdot \frac{1}{3} + (2-\frac{5}{2})^2 \cdot \frac{1}{3} + (3-\frac{5}{2})^2 \cdot \frac{1}{3} + (5-\frac{5}{2})^2 \cdot \frac{1}{3} = \underline{4{,}33}$

$s_y^2 = VAR(Y) = (8-\frac{5}{2})^2 \cdot \frac{1}{3} + (3-\frac{5}{2})^2 \cdot \frac{1}{3} + (1-\frac{5}{2})^2 \cdot \frac{1}{3} + (-2-\frac{5}{2})^2 \cdot \frac{1}{3} = \underline{\underline{17{,}666}}$

$s_{xy} = Cov(x,y) = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y}) = \frac{1}{3}\left((0-2{,}5)(8-2{,}5) + (2-2{,}5)(3-2{,}5) \ldots\right) = \underline{\underline{-8{,}66}}$

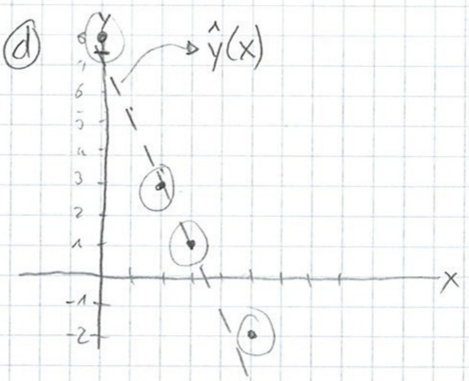
ⓑ $b_1 = \frac{s_{xy}}{s_x^2} x = \frac{-8{,}66}{4{,}33} x = -2x$

$b_0 = \bar{y} - \frac{s_{xy}}{s_x^2} \bar{x} = \frac{5}{2} - \frac{-8{,}66}{4{,}33} \cdot \frac{5}{2} = 7{,}5$

$\hat{y}(x) = b_1 + b_0 = \underline{\underline{-2x + 7{,}5}}$

ⓒ $r_{xy} = \frac{s_{xy}}{s_x \cdot s_y} = \frac{-8{,}66}{\sqrt{4{,}33} \cdot \sqrt{17{,}66}} = \underline{\underline{-0{,}990}}$

ⓓ



ⓔ Da der Betrag dieses Wertes nahe bei 1 liegt kann man von guter Korrelation sprechen, d.h. Punkte liegen nahe beisammen.

4.) Konfidenzintervall

$\Rightarrow$ bei unbekannten s_x wird t-Verteilung verwendet

ⓐ $CI = 0{,}99$, $n = 5$

$\overline{x} = \frac{1}{5}(660 + 667 + 654 + 663 + 662) = \frac{3306}{5} = \underline{\underline{661{,}2}}$ (empirischer Mittelwert)

$s_x^2 = Var(x) = \left[(660 - 661{,}2)^2 \cdot \frac{1}{4} + (667 - 661{,}2)^2 \cdot \frac{1}{4} + \ldots + (662 - 661{,}2)^2 \cdot \frac{1}{4}\right] = \underline{\underline{22{,}7}}$

$s_x = \sqrt{Var(x)} = \sqrt{22{,}7} = \underline{\underline{4{,}7645}}$

$\boxed{R: qt(0{,}995, 4) = 4{,}604}$

$\overline{x} - 4{,}604 \cdot \frac{s_x}{\sqrt{n}} < \mu < \overline{x} + 4{,}604 \cdot \frac{s_x}{\sqrt{n}}$

$661{,}2 - 4{,}604 \cdot \frac{4{,}7645}{\sqrt{5}} < \mu < 661{,}2 + 4{,}604 \cdot \frac{4{,}7645}{\sqrt{5}}$

$651{,}39 < \mu < 671{,}01 \quad \Rightarrow k =$

ⓑ $n = 24'000$

$\overline{x} = \frac{1}{2} \cdot 24'000 = 12'000$

$12000 - 2{,}576 \cdot \frac{0{,}00025}{\sqrt{24000}}$

$\frac{12000 - 120}{24000} < p < \frac{12000 + 120}{24000}$

$0{,}4955 < p < 0{,}5055$