CORRELATION EXERCISES

3) $\sum_{i=1}^{n} |x_i - y_i|^2 = (15^2 + 10^2 + 7^2 + 7^2 + 2^2 + 9^2 + 3^2 + 1^2 + 7^2 + 5^2 + 2^2 + 11^2 + 5^2 + 0^2 + 9^2 + 13^2)$

$= 939$

$n = 16$

$r_s = 1 - \frac{6 \times 939}{16 \times 255} = \boxed{-0.4588}$

~~0.375~~

$\alpha = 0.05$

$t = \frac{-0.4588}{\sqrt{\frac{14}{1 - 0.4588^2}}} = \boxed{-1.9321\,15}$

~~1.513575~~

$t_{critical} = 1.771$

$H_0: P \geq 0 \quad H_a: P < 0$

∴ The calculated test statistic is ~~high~~ lower than the critical value, the null hypothesis may be rejected

⇒ Literacy rate and corruption are negatively correlated

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4) POINT BI-SERIAL CORRELATION.

$\bar{X}_0 = (3.3 + 1.82 + 1.24 + 2.53 + 2.39 + 2.32 + 2.05 + 1.7 + 2.28 + 2.26 + 2.56 + 2.03 + 1.45 + 1.62 + 0.92 + 2.37 + 1.59 + 2.56)/n_0$

$n_0 = 18 \Rightarrow \bar{X}_0 = 2.088$

$\bar{X}_1 = (2.2 + 2.55 + 2.87 + 2.79 + 2.2 + 2.31 + 2.04 + 2.56 + 3.13 + 2.31 + 3.13 + 3)/12 \Rightarrow \bar{X}_1 = 2.591 \quad n_1 = 12$

$n = 30$

$S_x = \sqrt{\frac{8.375186666667}{29}} = 0.537400725$

$r_b = \frac{\bar{X}_1 - \bar{X}_0}{S_x} \sqrt{\frac{n_0 n_1}{n(n-1)}} = 0.935986828 \sqrt{0.248275862}$

$= \boxed{0.466377}$

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5) $N_{00} = 10 \quad N_{01} = 6 \quad N_{10} = 9 \quad N_{11} = 25 \quad N_{Total} = 40$

$N_{x0} = 16 \quad N_{x1} = 34 \quad N_{y0} = 19 \quad N_{y1} = 31$

$\phi = \frac{N_{11} N_{00} - N_{10} N_{01}}{\sqrt{N_{x0} N_{x1} N_{y0} N_{y1}}} = \frac{25 \times 10 - 6 \times 9}{\sqrt{16 \times 34 \times 19 \times 31}} = \boxed{0.346257}$