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1.3: Hypothesis testing for zero correlation

① Given: $n=30$, $r=0.4125$

$H_0: p=0$; $H_1: p>0$ → positive correlation

a) at the 5% level: 0.05 ; $p=0.3061 < 0.4125$. Reject H_0: there is reason to believe at the 5% level of significance that there is a correlation between the scores.

b) at the 1% level: 0.1 ; $p=0.4226 > 0.412$. Accept H_0: there is no evidence of correlation between the two scores at the 1% level of significance

② Given: $n=12$ $r=0.62$

$H_0: p=0$; $H_1: p \neq 0$

a) 10% level : → Two-tailed test : significance level (0.05)

⇒ $p=0.4973 < 0.62$; Reject H_0: there is reason to believe at the 10% level of significance that there is a correlation between the mass and the length of the otters.

b) 2% level : → Two-tailed test : significance level (0.01)

⇒ $p=0.6581 > 0.62$. Accept H_0: there is no evidence of correlation between the mass and the length of the otters at the 2% level of significance.

③ a) $r=-0.728$ (3SF)

b) $H_0: p=0$ $H_1: p \neq 0$ (Two-tailed test : SL = 0.025)

⇒ $p=0.8114 > -0.728$, Accept H_0: there is no evidence of correlation between the engine size and fuel economy at the 5% level of significance.

④ a) $H_0: p=0$, $H_1: p>0$ (positive correlation)

$p=0.7887 < 0.861$. Reject H_0: there is evidence of linear correlation at the 1% level of significance. There is evidence to suggest the company is correct.

⑤ Given: $r=-0.51$

$H_0: p=0$, $H_1: p<0$ (Negative correlation)

⇒ $p=0.4716$. Reject H_0: there is evidence of negative correlation at the 1% level of significance. There is evidence to suggest the council is correct.

⑥ Given: $n=12$ $r=0.7$

⇒ To reject the null hypothesis. Least possible would be 1% (as $p=0.3981 < 0.7$)

(7) Given: $r = -0.833$ Negative correlation: $p < 0$ SL: 0.005

To find the sample possible sample size, p has to less than 0.833.

For $n = 9$, $0.7977 < 0.833$.

(8) a) $r = 0.812$

b) $H_0 : p = 0$, $H_1 : p > 0$ (One-tailed test as $p > 0$; SL: 0.1)

$\Rightarrow$ $p = 0.7887 < 0.812$. Reject H_0: there is evidence of positive correlation at the 1% level of significance.

(9) a) $r = 0.786$

b) $H_0 : p = 0$, $H_1 : p > 0$ (One-tailed test as $p > 0$; SL: 0.025)

$\Rightarrow$ $p = 0.7067 < 0.786$. Reject H_0: there is evidence of linear correlation at the 2.5% level of significance.