

第十章 順序資料之假設檢定

2006 年 6 月 7 日 最後修改

10.1 (93-台大-商研)

1. Personnel specialist, Steve Satterfield, is assessing a new supervisor's ability to follow company standards for evaluating employees. Steve has the new supervisor rate five hypothetical employees on a scale of one to ten. He is interested in how the new supervisor's ratings correlate with company norms for these benchmark cases.

	Employee				
	1	2	3	4	5
New Supervisor	8	8	9	7	5
Company Norm	8	6	10	4	4

The Spearman rank correlation coefficient is _____.

(A) 0.80 (B) 0.85 (C) 0.90 (D) 0.95 (E) None of the above

【解】

原始資料		名次		(A-B) ²
A	B	A	B	
8	8	3.5	4	0.25
8	6	3.5	3	0.25
9	10	5	5	0
7	4	2	1.5	0.25
5	4	1	1.5	0.25
				1

$$r_s = 1 - \frac{6}{n(n^2 - 1)} \sum d^2 = 1 - \frac{6 \times 1}{5 \times (5^2 - 1)} = 0.95$$

10.2 (93-台大-商研)

6. The Wilcoxon test was used on 16 pairs of data. The total of the ranks (T) were computed to be 76 (for + ranks) and 60 (for - ranks). Calculate the Z value that would be used with this.

(A) -0.41 (B) -0.02 (C) 0.02 (D) 16 (E) None of the above.

【解】

$$n = 16 \quad T = \min\{76, 60\} = 60$$

$$E(T) = \frac{n(n+1)}{4} = \frac{16 \times 17}{4} = 68$$

$$V(T) = \frac{n(n+1)(2n+1)}{24} = \frac{16 \times 17 \times 33}{24} = 374$$

$$z = \frac{T - E(T)}{\sqrt{V(T)}} = \frac{60 - 68}{\sqrt{374}} = -0.413$$

10.3 (93-台大-商研)

8. Performance records for 18 salespersons are selected to investigate whether compensation methods are a significant motivational factor.

Compensation Method	Sales						
Straight Salary	18	12	22	28	28		
Straight Commission	27	34	34	27	20	16	24
Salary plus Commission	11	17	27	14	30	22	

A Kruskal-Wallis test is to be performed with $\alpha = 0.01$. The conclusion is to _____.

- (A) reject the null hypothesis
- (B) reject the alternate hypothesis
- (C) do not reject the null hypothesis
- (D) do not reject the alternate hypothesis

【解】

	S	C	SC	合計
	6	12	1	
	2	17.5	5	
	8.5	17.5	12	
	14.5	12	3	
	14.5	7	16	
		4	8.5	
		10		
ΣA	45.5	80	45.5	171
n_A	5	7	6	18
$(\Sigma A)^2/n_A$	414.05	914.29	345.04	1673.38

$$H = \frac{12}{n(n+1)} \left(\frac{(\Sigma A)^2}{n_A} + \frac{(\Sigma B)^2}{n_B} + \frac{(\Sigma C)^2}{n_C} \right) - 3(n+1) = \frac{1}{28.5} \times 1673.38 - 57 = 1.715$$

右尾檢定，自由度 $k-1=2$ 的 χ^2 分配， $\alpha=0.01$ ，拒絕區域 $R = \{\chi^2 > 9.21\}$

樣本檢定統計量 $H = 1.715 \notin R$ ，無法拒絕虛無假設 H_0

三種薪資方案間沒有差異。

10.4 (92-逢甲-經濟)

五. 三位老師教學評鑑結果如下。

教師	教學評分					
Wilson	84	76	75	64	92	65
Ross	83	81	74	76	94	
Anderson	76	81	52	67	83	

在顯著水準 $\alpha = 0.05$ 下，

(a)(5%) 以一因子變異數分析方法來檢定，三位老師的教學能力是否有顯著差異。

(b)(5%) 寫出(a)方法的模式及假設。

(c)(5%) 以 Kruskal-Wallis 方法來檢定，三位老師的教學能力是否有顯著差異。

【解】

(c)

	A	B	C	合計
	14	12.5	8	
	8	10.5	10.5	
	6	5	1	
	2	8	4	
	15	16	12.5	
	3			
ΣA	48	52	36	136
n_A	6	5	5	16
$(\Sigma A)^2/n_A$	384.00	540.80	259.20	1184.00

$$H = \frac{12}{n(n+1)} \left(\frac{(\Sigma A)^2}{n_A} + \frac{(\Sigma B)^2}{n_B} + \frac{(\Sigma C)^2}{n_C} \right) - 3(n+1) = \frac{1}{22.67} \times 1184 - 51 = 1.235$$

右尾檢定，自由度 $k-1=2$ 的 χ^2 分配， $\alpha=0.05$ ，拒絕區域 $R = \{\chi^2 > 5.9915\}$

樣本檢定統計量 $H = 1.235 \notin R$ ，無法拒絕虛無假設 H_0

三位老師間的教學能力沒有差異。