

Quick Questions 21 Nonparametric Hypothesis Testing of Ordinal Data Part I

- I. Data on defective parts produced by the night shift was presented on page 96 and has been reprinted below. Determine at the .01 level of significance whether these parts were randomly selected. Data has been entered horizontally from left to right starting with the top row.

Night Shift: P, P, P, F, P, P, P, F, P, P, P, P, P, F, P, P, F, P, F, P, P, P, P, F, P, P, P, F, P, P, P, P, P, P, P, P, P, P, P, P, P, P, P, F, P, P, P, P, P, P, P, P, P, P, P, P, P, P, P, F, P, P, P, P, F, P, P, P, P, F, P

$n_1 = 86$ passed
 $n_2 = 14$ failed
 $r = 29$ runs

$$\begin{aligned} \sigma_r &= \sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}} \\ &= \sqrt{\frac{2(86)(14)[2(86)(14) - 86 - 14]}{(86 + 14)^2(86 + 14 - 1)}} \\ &= \sqrt{\frac{2,408[2,408 - 100]}{(100)^2(99)}} \\ &= 2.37 \end{aligned}$$

$$\begin{aligned} \mu_r &= \frac{2n_1n_2}{n_1 + n_2} + 1 \\ &= \frac{2(86)(14)}{86 + 14} + 1 \\ &= \frac{2,408}{100} + 1 \\ &= 25.08 \end{aligned}$$

$$\begin{aligned} Z &= \frac{r - \mu_r}{\sigma_r} \\ &= \frac{29.00 - 25.08}{2.37} \\ &= 1.65 \end{aligned}$$

Z for .01/2 = .005 is ± 2.575 .
 H_0 is accepted because 1.65 is not beyond 2.575.
 Parts were drawn at random.

- II. Last year's weekly median number of customers renting from one of Linda's stores was 340. Determine at the .05 level of significance whether this sample indicates a change in weekly median customers.

1. Five median sale's figures were below 340. The sample size is 6.
2. The Binomial table (ST 1) yields the following: $P(\geq 5) = .094 + .016 = .11$. For this two-tail problem, $p = 2(.11) = .22$.
3. Accepted the null hypothesis because .22 is greater than .05. The median number of customers has not changed. With a sample this small, all 6 would have to be below last year's median to reject H_0 as $P(x = 6) = .016$ and $2(.016) = .032 < .05$.

Sample	Median	Sign
1	338	-
2	321	-
3	317	-
4	364	+
5	325	-
6	303	-