

- XI. A third assembly method has recently been proposed for the 30-milligram parts examined in problem 10. Use a .01 level Kruskal-Wallis test to determine whether these samples come from populations with equal medians.

Time to Assemble 30-Milligram Parts in Seconds											
Method C	86	99	84	85	92	93	82	81	96	83	94

Assembly Time for 30-Milligram Parts					
Method A		Method B		Method C	
Time	Rank	Time	Rank	Time	Rank
90	9	95	17.5	86	6
95	17.5	102	28.5	99	24.5
104	31	93	13.5	84	4
88	8	105	32	85	5
91	10.5	96	20	92	12
94	15.5	99	24.5	93	13.5
87	7	100	26	82	2
102	28.5	103	30	81	1
96	20	91	10.5	96	20
98	23	97	22	83	3
101	<u>27</u>	106	<u>33</u>	94	<u>15.5</u>
	197.0		257.5		106.5

H is the designated statistic.
N, the number of observations, is 33.
k, the number of samples, is 3.
n_k , a sample's size, is 11.
R_k is a sample's rank total.
$df = k - 1 = 3 - 1 = 2 \rightarrow \chi^2 = 9.21$

$$\begin{aligned}
 H &= \frac{12}{N(N+1)} \left[\frac{(\sum R_1)^2}{n_1} + \frac{(\sum R_2)^2}{n_2} + \dots + \frac{(\sum R_k)^2}{n_k} \right] - 3(N+1) \\
 &= \frac{12}{33(33+1)} \left[\frac{(197)^2}{11} + \frac{(257.5)^2}{11} + \frac{(106.5)^2}{11} \right] - 3(33+1) \\
 &= .0106951[3,528.091 + 6,027.841 + 1,031.114] - 102 \\
 &= 11.23
 \end{aligned}$$

H of 11.23 is greater than 9.21, the value of χ^2 for the .01 level of significance.

Reject H_0 , assembly time medians are not equal.