

### Answer on Question #56748 – Math – Statistics and Probability

The marketing department of a company has designed three different boxes for its product. It wants to determine which box will produce the largest amount of sales. Each box will be test marketed in five different stores for a period of a month. Information on sales is provided below.

	Store 1	Store 2	Store 3	Store 4	Store 5
Box 1	210	230	190	180	190
Box 2	195	170	200	190	193
Box 3	295	275	290	275	265

I know the treatments sum of squares is meant to be 24,467.2, however, whenever I calculate it I always get 25,682.2

The error sum of squares is meant to be 2022.14, but I always get 2733.2.

So can someone give me the specific calculations as to how I'm supposed to get 24,467.2 and 2022.14? Because I can't see anything that I've done incorrectly.

#### Solution

$$\begin{aligned} CM &= \\ &= \frac{(210 + 230 + 190 + 180 + 190 + 195 + 170 + 200 + 190 + 193 + 295 + 275 + 290 + 275 + 265)^2}{15} \\ &= 747273.6 \end{aligned}$$

The treatments sum of squares is

$$\begin{aligned} SST &= \frac{(210 + 230 + 190 + 180 + 190)^2}{5} + \frac{(195 + 170 + 200 + 190 + 193)^2}{5} \\ &\quad + \frac{(295 + 275 + 290 + 275 + 265)^2}{5} - 747273.6 = 24467.2 \end{aligned}$$

The total sum of squares is

$$\begin{aligned} Total\ SS &= 210^2 + 230^2 + 190^2 + 180^2 + 190^2 + 195^2 + 170^2 + 200^2 + 190^2 + 193^2 + 295^2 + 275^2 \\ &\quad + 290^2 + 275^2 + 265^2 - 747273.6 = 27200.4 \end{aligned}$$

Thus, the error sum of squares is

$$SSE_{error} = Total\ SS - SST = 27200.4 - 24467.2 = 2733.2$$

So, your answer for  $SSE_{error}$  is correct, but one for  $SST$  is false.

I also check this by means of analysis tool "Anova: Single Factor" from Data Analysis Add-in in Microsoft Excel, and results are the same.

Anova: Single Factor

SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Row 1	5	1000	200	400
Row 2	5	948	189,6	133,3
Row 3	5	1400	280	150

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	24467,2	2	12233,6	53,71111	1,03E-06	3,885294
Within Groups	2733,2	12	227,7667			
Total	27200,4	14				