

Quiz #5
Analysis of Variance

- 1) In Taguchi methods, the F value for a factor effect is defined as
 - a) The probability that we reject the hypothesis that the factor effect equals zero.
 - b) The sum of squares due to a factor divided by the error variance.
 - c) The mean square due to a factor divided by the error variance.
 - d) The sum of squares due to a factor divided by the DOF for the factor.

- 2) In Taguchi methods, “pooling” the variance of the factor effects with the lowest contributions to the total sum of squares:
 - a) Provides an unbiased estimate of error variance.
 - b) Provides an approximate estimate of error variance without the need for replicates.
 - c) Reduces the error variance thereby increasing the efficiency of a matrix experiment.
 - d) Cannot be performed before the confirmation experiment is complete.

The **data** below represent the results from an L9 with one noise factor in an outer array and three replicates. The **table** below the **data** represents the results of a one way (single factor) ANOVA ($\alpha=0.05$) with the first row representing the first sample and the second row representing the second sample. Note that this is not the usual use of ANOVA in Taguchi methods.

- 3) What does the F crit value represent?

- 4) What conclusion can you draw from this analysis?

- 5) Explain a few differences between this analysis and a Taguchi style use of ANOVA.

Experiment #	N1 #1	N1 #2	N1 #3	N2 #1	N2 #2	N2 #3
1	19	19.5	20.2	14	14	14.6
2	53.5	54.5	54	38.2	39.3	40.3
3	102.5	104.5	105	78.5	79.5	81.1
4	28	30.3	34	19	21.6	22
5	59	60.5	60.6	38.3	38.5	38.2
6	72.7	75.7	76.5	57.9	58.7	61.9
7	22	23.7	26	12.1	12.4	12.6
8	52.7	54.1	54.7	37.8	38	38
9	61	64.5	64	42.7	42.8	43.1

Anova: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
Row 1	6	275.3	45.88333	76.26967
Row 2	6	318.1	53.01667	125.0777

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	152.6533	1	152.6533	1.516318	0.24635064	4.964591
Within Groups	1006.737	10	100.6737			
Total	1159.39	11				