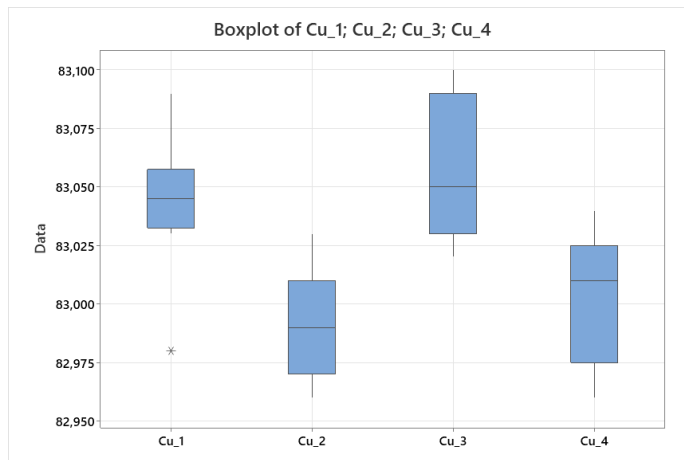


## Solution Problem 2.

a)



The alloys Cu\_1 and Cu\_3 seems to contain more copper than Cu\_2 and Cu\_4. For alloy Cu\_1 there is a potential outlier.

b)

## Analysis of Variance

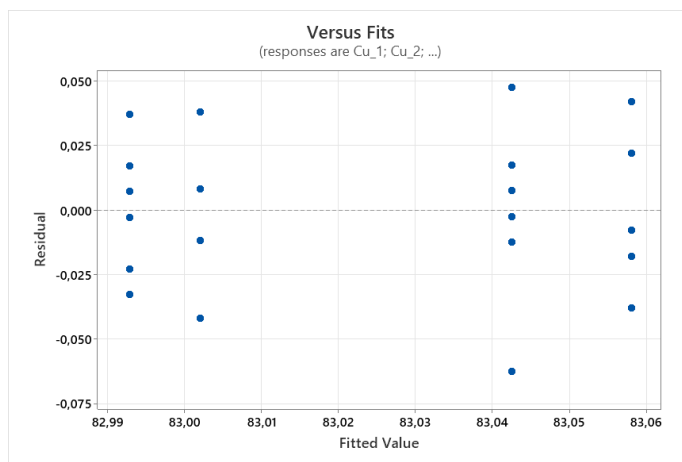
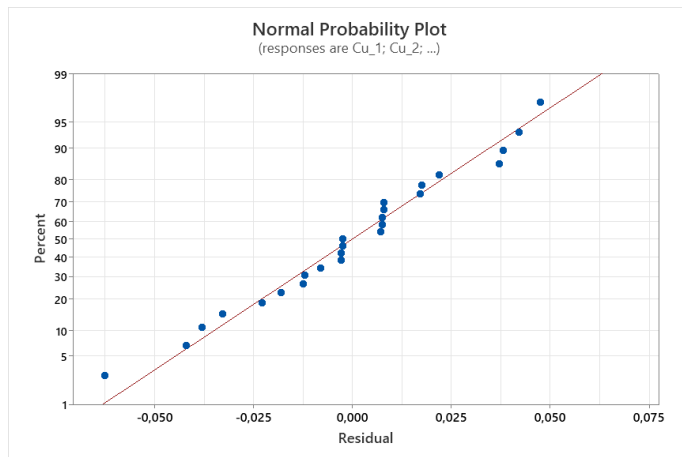
				F-	P-
Source	DF	Adj SS	Adj MS	Value	Value
Factor	3	0,01772	0,005908	7,03	0,002
Error	21	0,01765	0,000841		
Total	24	0,03538			

The p- value from the F-test is 0.002 and the nullhypothesis that all alloys are equal is rejected

## Means

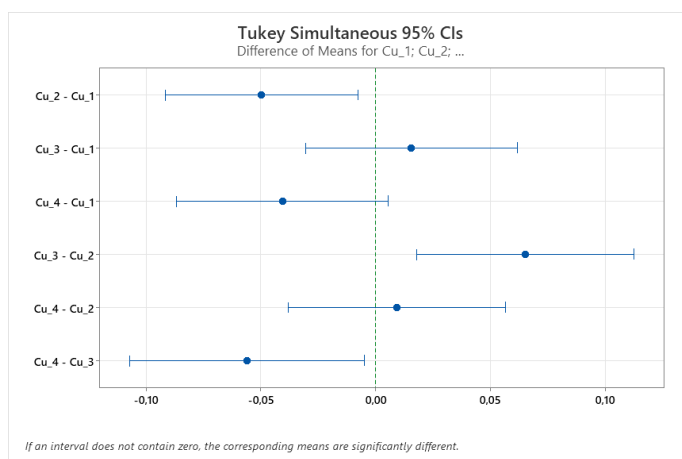
Factor	N	Mean	StDev	95% CI
Cu_1	8	83,0425	0,0311	(83,0212; 83,0638)
Cu_2	7	82,9929	0,0236	(82,9701; 83,0156)
Cu_3	5	83,0580	0,0319	(83,0310; 83,0850)
Cu_4	5	83,0020	0,0295	(82,9750; 83,0290)

Pooled StDev = 0,0289933



From the estimated standard-deviations it seems like all the variances are approximately equal. The normal plot looks okay, and the residuals plotted against the fitted values (the means) does not detect any serious violence of the assumptions. If we had known the order in which the experiments have been carried through, we could also have checked for pattern that could indicate dependence.

### c) Tukey's HSD



#### Grouping Information Using the Tukey Method and 95% Confidence

##### **Factor N    Mean Grouping**

Cu_3	5 83,0580	A	
Cu_1	8 83,0425	A	B
Cu_4	5 83,0020	B	C
Cu_2	7 82,9929		C

*Means that do not share a letter are significantly different.*

From the figure we observe that Cu\_2 and Cu\_4 group together (C, C). These should not be declared different. Likewise Cu\_1 and Cu\_4 (B, B) and also Cu\_3 and Cu\_1 ( A, A).