ST 314 - Data Analysis 6

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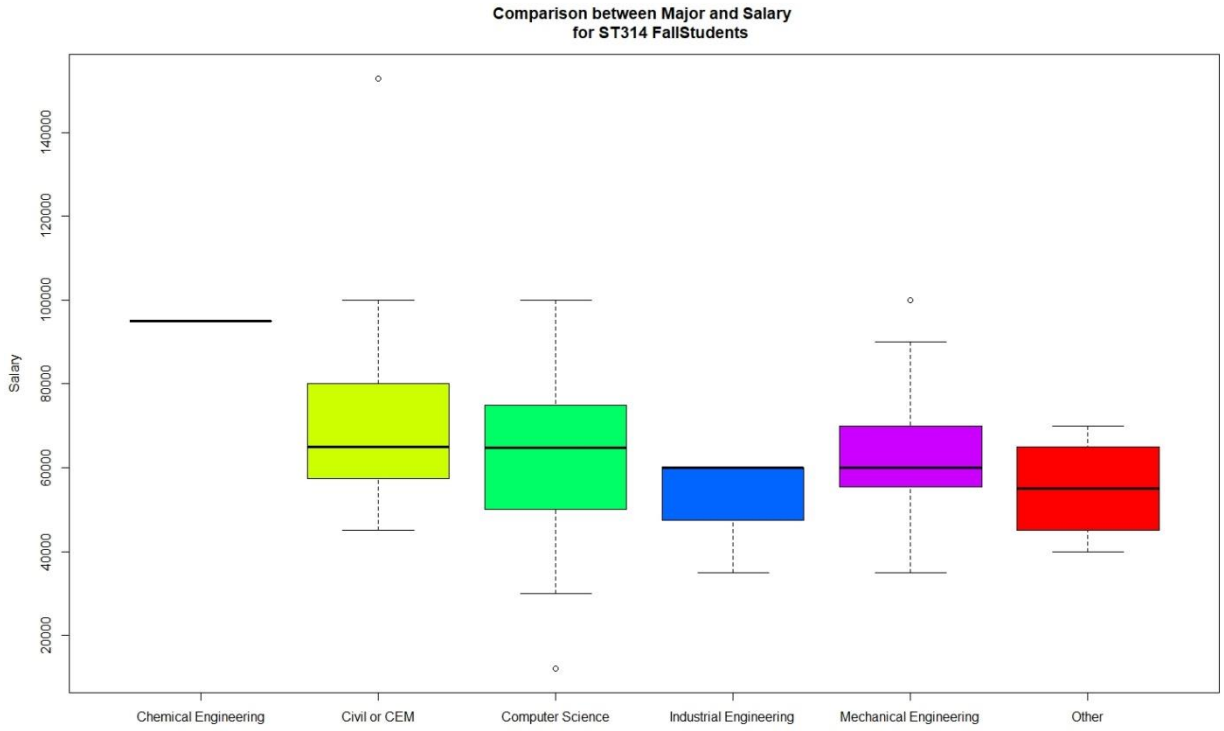
Part 1

a.



b. The average anticipated salary for Chemical Engineering seems to be different from all the other majors. The reason for this is because the boxplot of Chemical Engineering has very little, almost non-existent, spread and the median value of this boxplot is much higher than the medians of all the other boxplots (about 3000 higher). This suggests that the average anticipated salary for Chemical Engineering is higher than all the other majors.

c. $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6$
$H_a: At\ least\ two\ population\ means\ differ$

d. **Condition 1**: Samples are random and representative of population
False, the sample is collected only from Winter 2019 course, so there's a convenience bias.

Condition 2: Based on CLT, n_i's are sufficiently large for $\overline{x_i}$'s to be approx. normal
False, some majors have an observation of less than 30 which is not sufficiently large for $\overline{x_i}$'s to be approx. normal. For example, Chemical Engineering has only 1 student.

Condition 3: The I populations are independent
True, the different majors are independent from each other.

Condition 4: The I population variances are equal
False, we have no way of knowing if this is true or not.

e.

1.
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              Df    Sum Sq   Mean Sq F value Pr(>F)
Major          5 3.015e+09 602951738   2.069 0.0726
Residuals    144 4.197e+10 291431858
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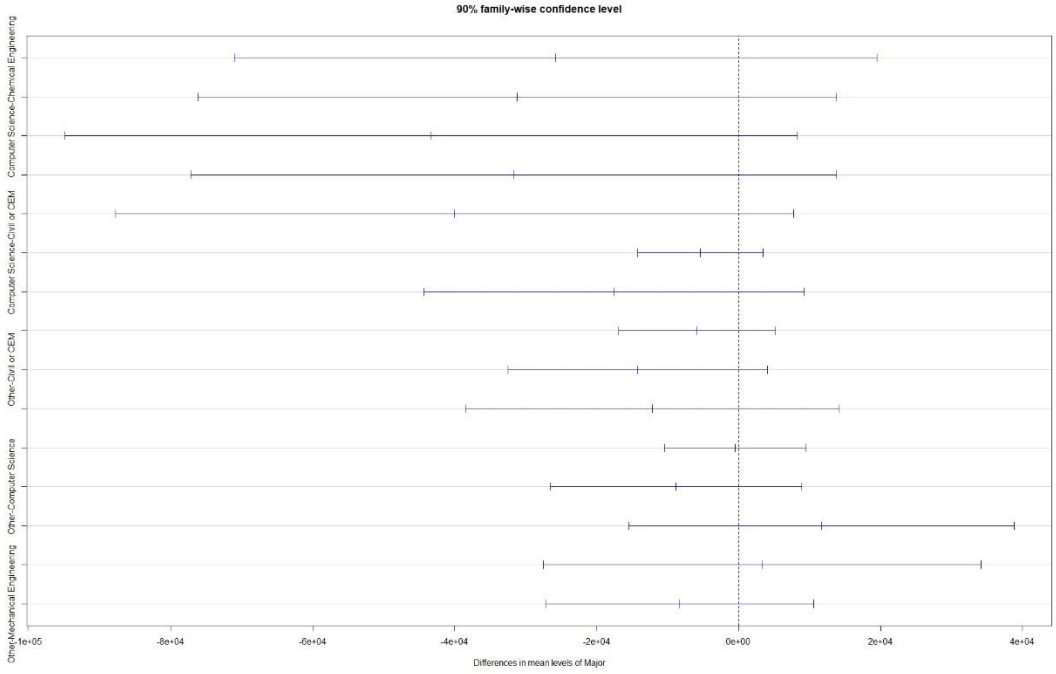
2. $MSTr = 602951738$
$MSE = 291431858$

f.

1. Reject the null hypothesis based on a significance level of 0.10.
($F = 2.069, p - value = 0.0726$)
2. There is a weak evidence that at least one of the mean anticipated salary differs from the others. ($0.05 < p - value < 0.10$)

g.

1.



	diff	lwr	upr	p adj
Civil or CEM-Chemical Engineering	-25771.4250	-70984.61	19441.757	0.6704982
Computer Science-Chemical Engineering	-31179.9675	-76151.76	13791.826	0.4602552
Industrial Engineering-Chemical Engineering	-43333.3333	-94900.41	8233.743	0.2449915
Mechanical Engineering-Chemical Engineering	-31678.5714	-77127.44	13770.302	0.4541114
Other-Chemical Engineering	-40000.0000	-87741.84	7741.836	0.2480184
Computer Science-Civil or CEM	-5408.5425	-14237.42	3420.334	0.5982369
Industrial Engineering-Civil or CEM	-17561.9083	-44294.85	9171.033	0.5218825
Mechanical Engineering-Civil or CEM	-5907.1464	-16911.10	5096.803	0.7243905
Other-Civil or CEM	-14228.5750	-32525.29	4068.137	0.3282470
Industrial Engineering-Computer Science	-12153.3658	-38475.99	14169.259	0.8324552
Mechanical Engineering-Computer Science	-498.6039	-10464.41	9467.205	0.9999945
Other-Computer Science	-8820.0325	-26511.84	8871.777	0.7823451
Mechanical Engineering-Industrial Engineering	11654.7619	-15474.90	38784.421	0.8707890
Other-Industrial Engineering	3333.3333	-27483.89	34150.556	0.9997511
Other-Mechanical Engineering	-8321.4286	-27193.05	10550.189	0.8578421

2. By inspecting our Multiple Comparisons table, we see that none of our comparisons are significant as none of them has an adjusted p-value of less than 0.10. Comparisons with the smallest p-values are between:
    - Industrial Engineering-Chemical Engineering (p-value = 0.245)
    - Other-Chemical Engineering (p-value = 0.248)
    - Other-Civil or CEM (p-value = 0.328)

3. The 90% F-W CI estimates the anticipated salary of Industrial Engineering Majors will be 94900 lower to 8233 higher than the anticipated salary of Chemical Engineering Majors, with an average difference of -43333. The difference is insignificant with an adjusted p-value of 0.245.