Test 2 Corrections

2 a, b

7a $H_{null}: \beta_2 = \beta_3 = 0$
$H_{alternate}$: at least one of β_2, β_3 is not equal to 0

b The ANOVA test used in problem 6b is most reliable to determine if there is any linear association among the variables, compared to the nested F-test used in problem 7a. This is because the ANOVA test used in problem 6b only depends on the assumptions for model 3 being met. Looking at the residual & normal quantile plots for model 3, we can see that the normality, linearity, and constant variance conditions are met. This means the ANOVA test in problem 6b will be reliable. The nested F-test used in problem 7a depends on the assumptions for both model 3 & model 1. Looking at the residual plot for model 1, we can see a slight curved pattern in the residuals. This indicates that the linearity assumption may be violated, making the nested F-test which relies on this model's assumptions less reliable than the overall ANOVA test.

8 First, I would plot displacement individually against the other predictor variables (transmission type & weight) to look for multicollinearity. If needed, I would also calculate VIF. If there is high multicollinearity, I would consider not including the displacement variable. Next, I would create an added variable plot to determine the additional contribution of displacement. If there was a correlation, I could conclude that this correlation represents the correlation between displacement & fuel consumption when accounting for the impact of the other predictor variables. Lastly, I would determine the adjusted R^2 for the model including displacement & the one without & compare them in order to determine if it is useful to add that variable.