Grace Long Torales

Applied Linear Models—Regression: HW 6

* 1. Based on the p-values from the partial F statistic (>0.05), the type of transmission does not significantly affect the mileage performance.
  2. Based on the p-values from the partial F statistic (<0.05), the interaction between vehicle weight and type of transmission significantly impacts the model. Furthermore, in this model, the p-value for the F statistic for transmission type alone (<0.05) does significantly impact the model. The model would be

where x11=1 when the transmission is manual and x11=0 when the transmission is automatic. Based on this, it appears that a manual transmission will typically get better mileage (positive parameter in front of x11), whereas a higher vehicle weight will typically get worse mileage (negative parameter in front of x10). Furthermore, when discussing the interplay between transmission type and vehicle weight, it appears that the role of vehicle weight outweighs the role of transmission type in the model (negative parameter in front of x10x11, similar to how the parameter in front of x10 is negative). Also, we can see that the parameters related to x10 are smaller than those that are not because the values for x10 are so comparatively large.

I intend to focus on environmental data. I will analyze water quality data pertaining to 20 reservoirs over the course of 31 years (1987-2018) published by the US EPA and associated with the following publication:

Smucker, N., J. Beaulieu, C. Nietch, and J. Young. Increasingly severe cyanobacterial blooms and deep water hypoxia coincide with warming water temperatures in reservoirs. GLOBAL CHANGE BIOLOGY. Blackwell Publishing, Malden, MA, USA, 27(11): 2507-2519, (2021).

All the data can be found at <https://catalog.data.gov/dataset/1987-2018-cyanobacteria-and-water-quality-data-for-20-reservoirs> in 13 excel files. The response variable that I will focus on will be cyanobacteria density (cells/mL) and the regressors that I will focus on will be nutrient density (units vary depending on the nutrient) and surface temperature (°C).