

MTH 3240 Lab 11 Answer Sheet

Due Thu., May 7

1 Part A

1.1 Pesticide Biodegradation Data Set

1. NA
2. *Don't* print the scatterplot matrix. Just answer the following question.

Based on the scatterplot matrix, in your judgment, which of the six explanatory variables (**nitrate**, **potassium**, **phosphorus**, **pH**, **organic matter**, or **microbial biomass**) exhibits the strongest relationship (positive or negative) to the response variable (**DT50**)?

3. Based on the correlations, which of the six explanatory variables (**nitrate**, **potassium**, **phosphorus**, **pH**, **organic matter**, or **microbial biomass**) exhibits the strongest relationship (positive or negative) to the response variable (**DT50**)?
4. Please answer the following questions from the output of `summary()` for the regression analysis.
 - a) Based on the **p-values** (`Pr(>|t|)` column), which (if any) of the six predictors exhibit a statistically significant relationship to **DT50**? Use a level of significance $\alpha = 0.05$.

b) Based on the **coefficients** of the equation of the fitted multiple regression model (`Estimate` column), by how much does the **DT50** increase (or decrease), on average, for each one-unit increase in **nitrate**?

Does **DT50** increase or does it decrease as **nitrate** increases (Increases/Decreases)?

c) Based on the **coefficients** of the equation of the fitted multiple regression model (`Estimate` column), by how much does the **DT50** increase (or decrease), on average, for each one-unit increase in **pH**?

Does **DT50** increase or does it decrease as **pH** increases (Increases/Decreases)?

d) The R^2 value (Multiple R-squared) is $R^2 =$

Using the criteria below, **how well** does the model containing the six explanatory variables fit the data (Poor, Medium, or Good)?

R^2	Model Fit
0.0 to 0.25	Poor
0.25 to 0.65	Medium
0.65 to 1.0	Good

5. **Don't** print the plot, just answer the following question.

Based on the plot, does the assumption, required by the t tests, that the residuals¹ follow a normal distribution appear to be met (Yes/No)?

¹More formally, we're checking that the **errors** ϵ in the regression model are normally distributed.