

# Homework 1 Suglia

*Elena Suglia*

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## Question 1

Load the data set “CO2\_HW1.txt”, which describes the CO2 uptake rates of plants of the grass species *Echinochloa crus-galli* from Quebec and Mississippi.

```
d = read_table2("CO2_HW1.txt", col_names = TRUE)
d = as_tibble(d)
```

Using a linear model for the analysis, investigate these questions:

How does the air concentration of CO2 (“logconc”) affect a grass plant’s CO2 uptake rate (“uptake”) ? Does this effect depend on the origin of the plant (“Type”) ?

In your answer, include some information on: What transformations if any you made on the data and why. What steps you took to check model assumptions and model performance. What the coefficients of the model are and how you interpret them.

## Question 2

Load the data set “ecdata\_HW1.txt”, which includes some growth and flowering time information on some *Erodium cicutarium* plants from serpentine and non-serpentine environments. The columns are: sourceSOILTYPE: soil type of source population, 1 = non-serpentine, 2 = serpentine earlylfn: count of leaves early in the plant’s growth totallfn: count of total leaves at end of experiment fdate: date of first flowering in days after germination

Fit a normal distribution to the *Erodium* fdate data. Also fit a gamma distribution – does this distribution fit the data better or worse than the normal distribution does? Which is “better” by AIC score, or they both about the same?

Calculate the log-likelihood for the normal distribution at the fitted values of the parameters. Show (graphically or in numbers) that the log-likelihood of the data becomes more negative if you shift the mean parameter value away from its maximum-likelihood value.

## Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.