

## Tutorial 9

### Design of Experiments

The following experiments were run to maximize the height of plants grown in a greenhouse:

Experiment order	Soil amount, <b>A</b>	Water amount, <b>B</b>	Height of plant
1	200 grams[−]	100 mL [+]	61 mm
2	200 grams[−]	50 mL [−]	39 mm
3	400 grams[+]	100 mL [+]	82 mm
4	400 grams[+]	50 mL [−]	50 mm

Create a prediction model from your box plot hand calculations of the form:

$$y = a + b_A x_A + b_B x_B + b_C x_A x_B \text{ where you report the coefficients.}$$

- 1) Draw the cube plot for the system and calculate the main effects. Write out the regression model.
- 2) Write out the standard order table including the interaction terms.
- 3) Analyze the data using Python. Generate interaction plots and the OLS summary. Describe the interaction plot and write out the equation from the OLS summary.
- 4) Generate a contour plot. What would be your next steps after seeing this contour plot?