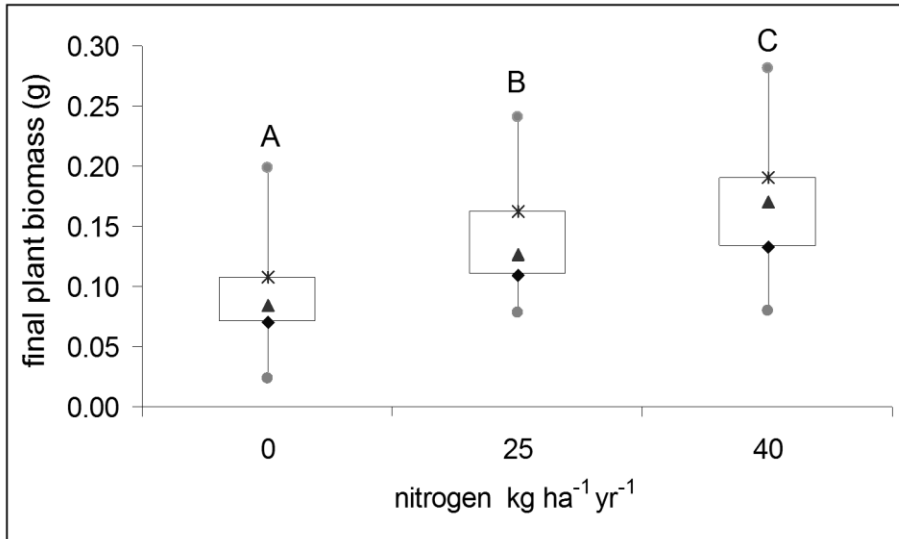


Quiz: Box plots & t-tests

1. Figure 1. Boxplots showing the effect of nitrogen deposition on *Asclepias tuberosa* final dry biomass (n = 30 per plot). The top and bottom points in each plot are the maximum and minimum values, respectively. The tops and bottoms of the boxes are the lower and upper quartiles for each nitrogen treatment. The triangle within each box represents the median. Different letters above plots indicate significant differences among treatment means. Data from Zehnder & Hunter (2009)

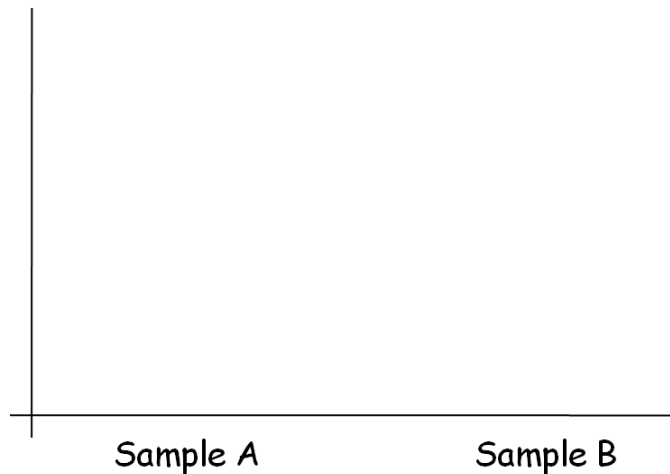


- a) What was the impact of nitrogen deposition on final plant biomass?
- b) Visually estimate the minimum, maximum, median, Q1, Q3 and the IQR for each treatment.

Treatment	Min.	Max.	Median	Q1	Q3	IQR
0						
25						
40						

2. Use the data below to construct box plots of the two samples. Round to whole numbers.

Sample A	Sample B
24	6
36	17
13	10
7	13
45	51
18	14
25	17
19	52
37	27
30	39
46	14
34	57



- a) In Sample B, why is the median not in the exact center of the box (i.e. why is the distance from Q1-Q2 not the same as the distance from Q2-Q3)?
- b) Which sample (A or B) has a normal distribution? Explain your answer.
- c) Do you think that samples A and B were collected from the same population? Why or why not?

3. A researcher hypothesized that increased levels of atmospheric CO<sub>2</sub> would influence aboveground plant biomass of a grass species. The scientist grew 9 grass plants in chambers with elevated levels of CO<sub>2</sub> and another 9 grass plants in chambers with reduced levels of CO<sub>2</sub>. After 3 weeks of growth she harvested the aboveground plant biomass, dried the plants and weighed them. The data are presented below.

Plant biomass in grams

Elevated CO <sub>2</sub>	Reduced CO <sub>2</sub>
54	45
63	36
45	35
96	26
85	58
48	22
89	31
52	41
75	22
56	26

Sample mean		
Sample size		
Sample variance	342.68	130.62

- a) State the null hypothesis:
- b) State the alternative (research) hypothesis:
- c) How many degrees of freedom for your t-test?
- d) What is your t-critical from the table?
- e) What is your computed t-statistic?
- f) Is there a significant difference between the two groups?
- g) State these results as you would in the results section of a lab report (include a statement of the results and the statistics).
- h) Interpret these results as you would in the discussion section of your lab report (i.e. what do these results mean).