Short Questions

1. What are the three main data types in R? (3 marks)
2. What is one similarity and one difference for every pair of comparisons between a vector, a matrix and a data.frame? (3 marks)
3. What is an appropriate statistical test and graph to:
   1. Compare blood pressure between males and females in a healthy and cardiovascular disease population? Explain or justify your answer. (2 marks)
   2. Compare if males are more affected than females by hypertensive disorders? Explain or justify your answer. (2 marks)
4. Why would you use principal component analysis (PCA) to investigate a data set? How are the components made? (4 Marks)
5. In the two barcode plot images of gene set enrichment, which is likely a significant finding and which is not. Why do you think this? (3 marks)

Diagram

Description automatically generated

Long answer questions

1. Your graduate student wants to conduct an experiment to determine the effect of age on high fat diet on placentas of mice using RNA-sequencing. For age you decide that 8-week mothers (young) will be compared to 35 weeks (old) mother.
   1. Help them design an experiment, explaining your decisions. (8 marks)
   2. Your student tells you they can only process 8 samples per day, will this be important to the experimental design? Why or why not? (4 marks)