

# BIOE: Biostatistics Course Fall 2017

## Assignment 1

**Due 12th October**

1. Calculate the mean, median and mode for the following data:

140, 220, 90, 180, 140

2. Find the range for the sequence of values:

45, 64, 68, 51

3. Give an example of a statistic?

4. Write out the formula for the population and sample standard deviations.

5. Given the following **population** of values (you can use a calculator with a statistics functions):

12, 6, 7, 3, 15, 10, 18, 5.0

i) Compute the population mean

ii) Compute the population standard deviation

iii) Compute the population variance

iv) If the data were a sample what would the standard deviation be?

6. Using your textbooks, write out the definition of a sample space

7. Using your textbooks, write out the definition of an event

8. Give two examples of discrete samples spaces

9. Using the sample spaces you gave in the previous question, give two examples of events for each of the sample spaces

10. Two letters are randomly chosen, one after another, from the word Nero. Write out the sample space.

11. Draw the Venn diagrams for  $A \cup B$ ,  $A \cap B$  and  $A \cap \overline{B}$

12. Using the Navidi textbook, write out the three axioms of probability (Research Chap 2)
13. State the general addition rule of probability
14. Under what conditions does the general addition rule apply?
15. A 10 sided die is thrown. What is the probability of getting an even number?
16. A bowl contains a mixture 2 red balls and 4 blue balls.
  - a) What is the probability of picking out a red ball?
  - b) What is the probability of picking out a blue ball?
17. Two 6-sided dice are rolled. What is the probability that the sum of the two numbers on the dice will be 5?
18. Two fair coins are thrown onto a table. Write out the sample space and determine the probability of getting a heads on one coin and a tails on the other?
19. Given a fair coin what is the probably of throwing (T=tails, H = heads):
  - a) THTTH
  - b) TTTTT
20. Draw at random three cards (**without replacement**) from an ordinary deck of cards (of 52 cards). Compute the probabilities for the events
  - a) All three are hearts
  - b) None of the cards is hearts
  - c) All three are aces.
21. In a group of 150 people, 60 are over the age of 30, 55 are women, and 25 are women over 30. Find the probability that a person picked from this group at random is either over 30 or a woman. Draw a venn diagram to illustrate the problem.

### **UNDERGRADUATES ONLY**

22. Dan Ratner has not studied for his statistics test. He does not know any of the answers on a three-question true-false test, and he decides to guess on all three questions.

a) Create a simulation using python to estimate the probability that Dan will Pass the test. (i.e. guess correct answers to at least 2 of the 3 questions)

b) Calculate the theoretical probability that Dan will pass the test.

A random undergraduate will be asked to present the problem and their solution.

**GRADUATES ONLY**

23. Write a program in Python to simulate the Monty Hall Problem

[https://en.wikipedia.org/wiki/Monty\\_Hall\\_problem](https://en.wikipedia.org/wiki/Monty_Hall_problem)

A random graduate will be asked to present the problem and their solution.