

## Session 2: Descriptive Statistics/Probability I

# Exercises

1. Categorize the following variables into nominal, ordinal, discrete, or continuous:

1. Viral load
2. Age measured in years
3. Price of your lunch
4. Country of origin

2. Calculate:

$$\sum_{j=10}^{12} j?$$

3. Calculate:

$$\sum_{j=1}^3 j^2$$

4. What is the mean of -5, 10, and 0?

5.

- a. What are the mean and median birth weights of babies born to mothers living with HIV: 1400g, 1500g, 1200g, 1500g?
- b. Is the mean or median a better summary of the central tendency of birth weights?
- c. Suppose the sample of birth weights of babies born to mothers living with HIV is: 1200g, 1400g, 1500g, 1500g, 5000g. Would your answer to b. change? Why or why not?
- d. Suppose the mothers were given nutritional supplements during pregnancy and their babies' birth weights in a) increased by 100g each. What is the mean birth weight?

6. a. What are the variance and standard deviation of the following birth weights: 1200g, 1400g, 1600g?
- b. What is the variance and standard deviation if 100g is added to each birth weight?

Questions 7, 8, 9:

Suppose a new student has joined your lab and is learning how to culture cells. Their reference letter says that 25% of the new student's experiments fail. They only have time to create 3 cultures.

Recall,

$$P(X = k) = \frac{n!}{k!(n-k)!} p^k (1-p)^{n-k}$$

where, e.g.,  $4! = 4 \times 3 \times 2 \times 1 = 24$

7. What is the probability that exactly 1 experiment fails?
8. What is the probability that at least 1 experiment fails?
9. What is the probability that all experiments succeed?
10. A couple intends to have 5 children and both are carriers of myotonic dystrophy, a dominant trait. Therefore, the probability that a child has the trait is 0.75. What is the probability that at least 1 child will have the trait?
- 11: Calculate the mean and variance of a binomially distributed random variable with n trials and success probability p.