# STAT 270
Sample Midterm 1

Name:

Student ID:

Instructions:

- There are 6 pages in this exam booklet, including cover page.

- There are 6 questions. Please read all questions carefully and write the answers in the space provided for each question.

- Define all variables/events used in your solutions

- The exam time is 50 minutes.

- You are allowed to have a one-sided cheat sheet and a non-programmable calculator.

Good luck!

1. Consider the boxplot for the heights of two groups of moose,
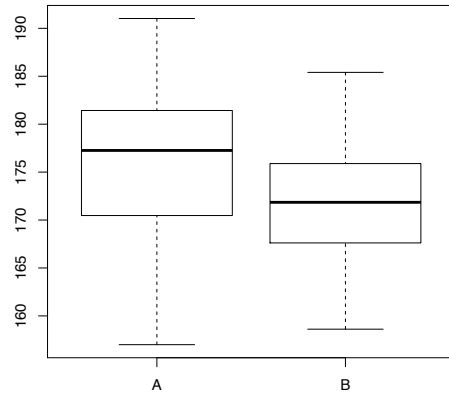
(a) What is the sample median of group A (approximately)? (1 mark)

(b) Which group has a larger variance? (1 mark)

(c) What percentage of the moose are higher than 167.5cm in group B (approximately)? (1 mark)

(d) Compare the symmetry and skewness of the two groups. (1 mark)

2. Consider a data set of size $n = 5$ with sample median, $\tilde{x} = 12.5$, sample mean, $\bar{x} = 14.65$ and sample variance $s^2 = 106$. If a new data set is constructed by adding 3.5 to all data values and then deviding each by 4. Calculate the sample median, sample mean, and the sample variance for the new data set. (3 marks)

3. If A, B, and C are events, draw a Venn diagram involving A, B, and C and shade the area corresponding to the events, (3 marks)

   (a) $(A \cap C) \cap \bar{B}$

   (b) $C \cap (\bar{A} \cup \bar{B})$

   (c) $[A \cap (\overline{B \cup C})] \cup [B \cap (\overline{A \cup C})] \cup [C \cap (\overline{A \cup B})]$

4. Consider a box containing fifteen frogs. Five of these frogs are over-weight, five are underweight and the other five are just in shape. If we let the frogs out of the box one by one in random order,

   (a) What is the probability that all the overweight frogs come out among the first ten frogs? (1 mark)

   (b) What is the probability that after letting ten frogs out only two types of frogs are left in the box? (1 mark)

   (c) What is the probability that two of each type of frogs come out among the first six frogs? (1 mark)

5. In a statistics class the following information is collected regarding the eye collor and the type of chocolate that the students consume, (assuming that each person consumes only one type of chocolate)

eye collor/ chocolate	white	milk	dark
blue	15%	10%	7%
brown	13%	8%	10%
black	16%	10%	11%

e.g. 15% of the students have blue eys and like white chocolate.

(a) What is the probability that a randomly selected student either has black eyes or likes dark chocolate? (1 mark)

(b) If a randomly selected student has blue eyes what is the probability that s/he likes milk chocolate? (1 mark)

(c) If a randomly selected student has either brown or blue eyes, what is the probability that s/he likes white chocolate? (1 mark)

6. Let S, B, I denote respectively the events that my sister, my brother and I decide to have pancakes for breakfast in a weekend. If the probability of the events are $P(S) = .7$, $P(B) = .5$ and $P(I) = .4$ and we live in different cities in different parts of the world and do not talk about our weekend breakfast (the events are independent), what is the probability that in a particular weekend

   (a) all three of us have pancakes for breakfast? (1 mark)

   (b) at least one of us has pancakes for breakfast? (1 mark)

   (c) Only my brother has pancakes for breakfast? (1 mark)

   (d) Exactly one of us has pancakes for breakfast? (1 mark)