

Term: Fall 2023

Name: Solution Set

Instructor: Patricia Wrean

MATH 156
Test 4, Version A

Total = $\overline{25}$

- All of the work on this test must be your own.
- You may use a scientific calculator. You may not use a calculator with graphing capability or a smartphone app. You may not share calculators between students.

GOOD LUCK!

1. (3 points) Consider the following variables concerning a statistics textbook.
- (a) The number of pages
 - (b) The name of the publishing company
 - (c) The price of the textbook
 - (d) The weight of the textbook

Which of these variables are qualitative? _____

b

From the quantitative variables, which are discrete? _____

a, c

+1 every correct answer
-1/2 every incorrect answer

2. (3 points) The National, CBC's news broadcast, wants to conduct a poll of its viewers to find out their average age. To do this, they ask people watching the latest broadcast to go to the CBC website and give their age to the nearest year.

Would you expect the distribution of ages from this poll to be the same as the distribution for the general population of Canada? Select all correct answers (you may choose more than one).

- (a) Yes, because it is a simple random sample.
- (b) No, it is a convenience sample.
- (c) Yes, provided that many people go to the website and answer the question.
- (d) No, because, for example, babies and very young children would not be represented.
- (e) There is not enough information to say.

b
 d
 not choosing anything else

3. (2 points) State whether the following study is experimental or observational by circling the correct choice.

A study took random sample of adults and asked them about their bedtime habits. The data showed that people who drank a cup of tea before bedtime were more likely to go to sleep earlier than those who didn't drink tea.

Expt / Observ

4. (6 points) The gas prices (in cents per litre) for regular gas at a sample of gas stations in Victoria are as follows:

~~132.9, 120.9, 117.9, 127.9, 117.9, 114.9, 128.9, 117.9~~
~~114.9, 117.9, 117.9, 117.9, 120.9, 127.9, 128.9, 132.9~~

- (a) State the mean, median, and range of this data set. If appropriate, round to two decimal places.

3

$$\bar{x} = \frac{\sum x_i}{n} = \frac{979.2}{8} = 122.4$$

$$\text{median} = \frac{117.9 + 120.9}{2} = 119.4$$

$$\text{range} = \text{max} - \text{min} = 132.9 - 114.9 = 18$$

mean: 122.4
 median: 119.4
 range: 18

- (b) The standard deviation of this data set is 6.57 cents per litre. Calculate the z-score of the lowest data point and indicate whether that value is likely or unlikely.

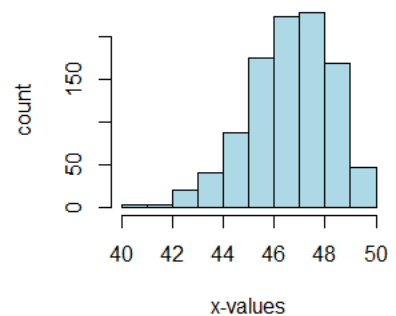
$$z_{\text{low}} = \frac{x - \bar{x}}{s} = \frac{114.9 - 122.4}{6.57} = -1.14155$$

z-score: -1.14
 likely / unlikely
 |z| < 2 is likely

(-1) if dropped negative sign

5. (2 points) Describe the shape and symmetry of the histogram shown below. If appropriate, include the direction of the skew.

unimodal and asymmetrical
 (1) - skewed left
 (1)



6. (2 points) An ad for an breakfast cereal states that “Our cereal contains 75% more vitamins and minerals.” What is misleading about this statement? Explain briefly.

75% more than what?

detached statistic - what the cereal is being compared to isn't given

7. (2 points) A market researcher for Air Canada wishes to interview a random selection of passengers who flew with Air Canada in the past year. For the following situations, identify the sampling plan used to pick these passengers.

(a) The researcher randomly selects 10 flights from the past year, and interviews all passengers that were on each of those flights. cluster

(b) The researcher makes a list of all of the Air Canada passengers in the past year. The fifth passenger on the list is selected and then every 50th passenger after that. 1-in-50 systematic

8. (3 points) The average yearly consumption of fresh fruit in Canada is 68.8 kg per person. Suppose that the distribution of fruit consumed is unimodal and symmetrical with a standard deviation equal to 3.1 kg per person.

(a) Find the interval in which at least 75% of the measurements will fall. Show your work.

$$1 - \frac{1}{k^2} = 0.75$$

$$\frac{1}{k^2} = 0.25$$

$$k = 2 \quad (1)$$

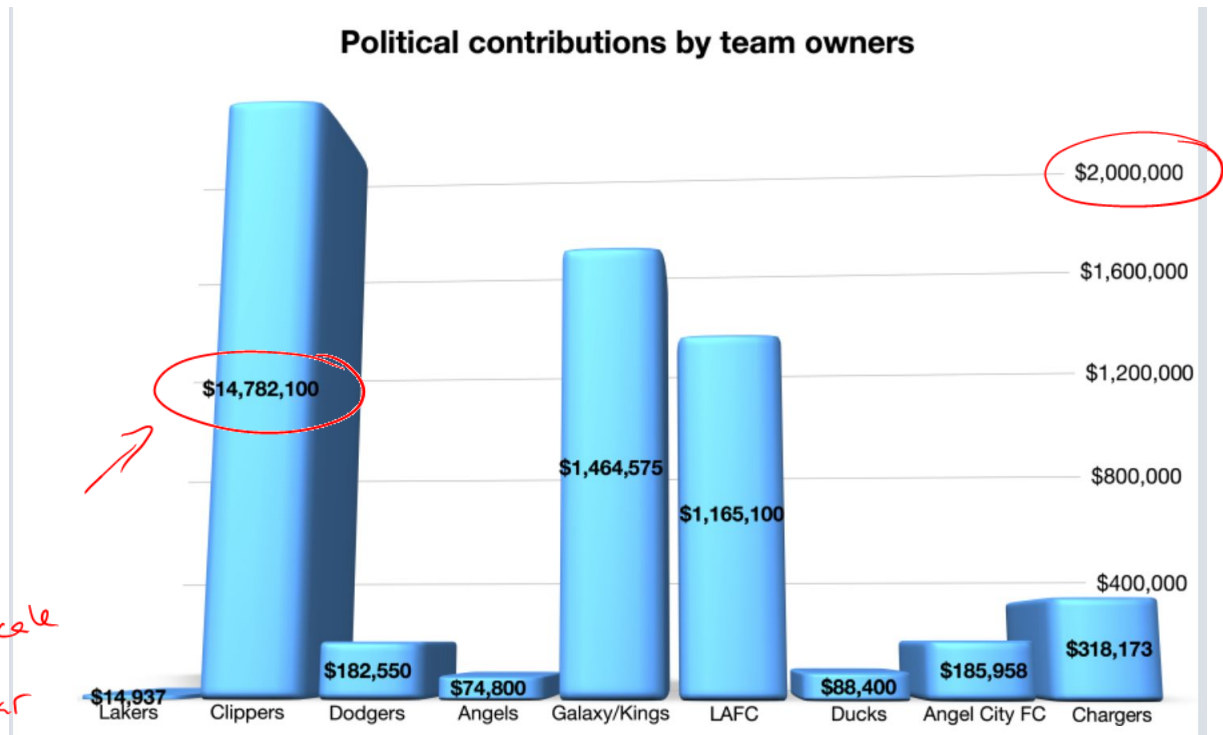
from 62.6 kg/person to 75.0 kg/person (1)

$$\text{want } 68.8 \pm 2(3.1)$$

(b) If the fruit consumption was found to be skewed instead, would the interval that you found in part (a) still be valid? Yes / No

Tcheby works for all distributions (1)

9. (2 points) The following graph was published by the LA Times newspaper. There is one main reason that this graph is misleading. Give that reason.



incorrect vertical scale
 - this bar should be 7 times larger!

(2)

if you missed the really big problem but said

- inappropriate 3D

(-1)

- if said that the Galaxy/Kings bar or LAFC bar was too tall but missed Clippers bar

(-1)