

Test 1-1

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Name: _____
Number: _____
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Score: ____/39

Problem 1: North Vancouver City Council has requested a household survey be conducted. The city is broken into many districts and unique neighbourhoods, some including large homes, some with apartments, and others a diverse mixture of housing structures. For each part below, identify the sampling methods described, and describe the statistical pros and cons of the method in the city's context.

a. Randomly sample 200 households.

b. Divide the city into 20 neighbourhoods, and sample 10 households from each neighbourhood.

c. Divide the city into 20 neighbourhoods, randomly sample 3 neighbourhoods, and then sample all households from these 3 neighbourhoods.

d. Divide the city into 20 neighbourhoods, randomly sample 8 neighbourhoods, and then randomly sample 50 households from those neighbourhoods.

e. Sample the 200 households closest to the City Council offices.

Score: ____/5

Problem 2: Study the spreadsheet from 2022 Beijing Winter Olympics on eLearn's Test 1 link. Remember to save your final result on excel before submitting on eLearn. Make a column for the total number of medals won by each country, then make a scatter plot of the total medal won versus the number of gold medals won. Describe the relationship between the two variables. Make sure to discuss unusual observations, if any.

Score: ____/4

Problem 3: Find the median, mean, and standard deviation of the total number of medals won by the countries listed in the 2022 Beijing Winter Olympics spreadsheet on eLearn. Write the numerical results on paper and record also on the spreadsheet.

Score: ____/3

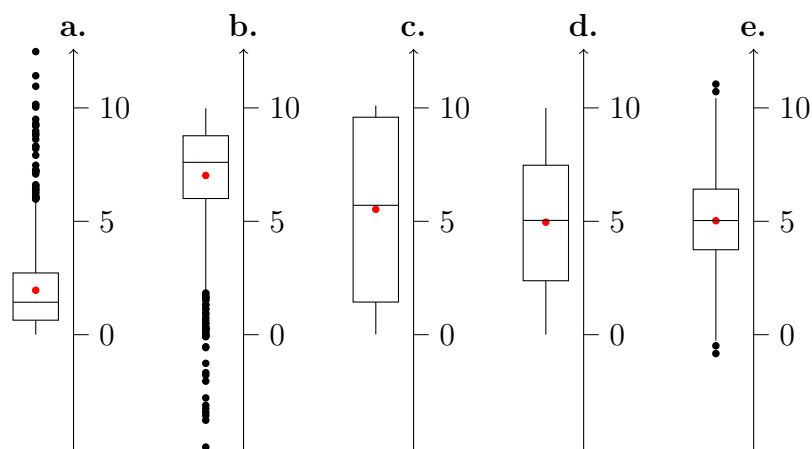
/12

Problem 4: In a study of three nationally representative large-scale data sets from Ireland, the United States, and the United Kingdom ($n = 17\,247$), teenagers between the ages of 12 and 15 were asked to keep a diary of their screen time and answer questions about how they felt or acted. The answers to these questions were then used to compute a psychological well-being score. Additional data were collected and included in the analysis, such as each child's sex and age, and on the mother's education, ethnicity, psychological distress, and employment. The study concluded that there is little clear-cut evidence that screen time decreases adolescent well-being.

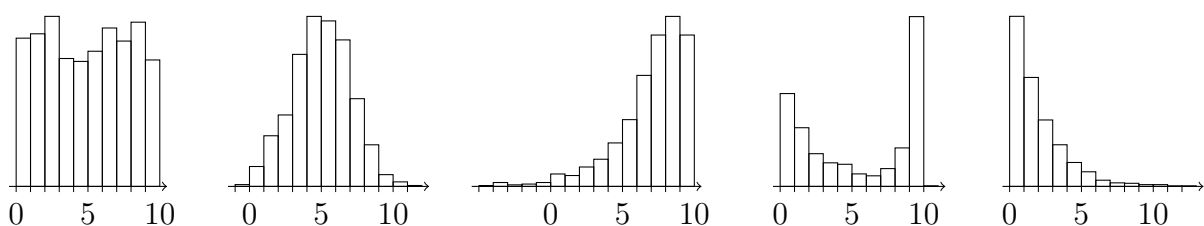
- What type of study is this, observational or experimental?
- Identify the explanatory variables.
- Identify the response variable.
- Explain how the study could arrive at the conclusion.

Score: /4

Problem 5: Match each box-and-whisker plot with its histogram.



Write the letter of the box-and-whisker plot on the histogram.



Score: /5

Problem 6: Flip a fair coin three times and make a table for its probability distribution.

Score: /3

Problem 7: In your sock drawer you have four blue, five grey, and three black socks. Half asleep one morning you grab two socks at random and put them on. Draw a **probability tree** of grabbing two socks without replacement from the drawer. Then for each case below, find the probability you end up wearing

a. no grey socks

b. at least one black sock

c. a red sock

d. matching socks

Score: /5

Problem 8: The table below shows the distribution of books on a bookcase based on whether they are fiction or non-fiction and hardcover or paperback.

	Hardcover	Paperback	Total
Fiction	13	59	72
Non-fiction	15	8	23
Total	28	67	95

Find the probability of drawing a hardcover book first then a paperback fiction book second when drawing without replacement.

Score: /2

Problem 9: In a glass factory, three machines, X , Y , and Z , are used to produce glass bottles. Machine X produces 35% of the glass bottles, machine Y produces 42% of the glass bottles and the rest of bottles are produced by machine Z . It is known that 3% of the bottles produced by machine X are defective, 2% of the bottles made by machine Y are defective, and 4% of bottles made by the machine Z are defective.

- a. Draw a tree diagram to illustrate all possible outcomes and associated probabilities on the edges.
- b. What is the probability that a glass bottle will be defective?
- c. Given that a bottle was found defective, what is the probability that it was made by the machine Y ?

Score: /5

Problem 10: From Activity 2, you examined `acs12`, a spreadsheet with a sample of 2021 US census. Define X to be the random variable for the mean age of a sample of 30 people recorded on the spreadsheet. Perform sampling of 30 cases ten times and record all ten sample means below and on another spreadsheet. How close is the mean of all people on the spreadsheet compared to the mean of the sample mean?

Score: /3