

Test 1

Show all your work

Name: _____
Number: _____
Signature: _____
Score: ___/47

A TI-83/84 calculator allowed.

Problem 1: Use your calculator to evaluate the following. Round your answers to 6 decimal places.

a. $\frac{\sqrt{32.17 - 11.78}}{12.39 + 3.2^2} \approx$

0.199 537

b. $\left(\frac{17}{5}\right)^{3.2} \times 5.4 + \left(\frac{2.3}{1.1}\right)^5 \approx$

311.062 614

Score: /3

Problem 2: Identify the variable type or data type in each of the following as QUALITATIVE (CATEGORICAL) or QUANTITATIVE (NUMERICAL).

a. The length of time a Capilano employ has been smoking.

quantitative

b. The type of cell phone used by a Capilano student.

qualitative

c. The number of cups of coffee served by Tim Hortons at Capilano today.

quantitative

Score: /3

Problem 3: Complete the following sentence: STATISTICS IS

the science of planning studies and experiments, obtaining data, and then organizing, summarizing, presenting, analyzing, interpreting, and drawing conclusions based on the data.

Score: /2

Problem 4: For each task, propose the best sampling method from random, simple random, systematic, stratified, cluster, or convenience. Provide a one-sentence rationale for your chosen method.

a. Winter Olympic Games performance enhancing drug test for athletes to detect whether an athlete uses any.

Simple random sampling: pick a country, then pick an athlete.
This avoids singling out Russia.

b. To find the average number of hours per week Capilano students work in their jobs.

Systematic sampling is easier to administer. Take the list alphabetically, then choose every 20th student to survey.

Score: /6

Problem 5: Patients suffering from chest pain were asked to rate the severity of their pain on the 7-point scale where 0 means no pain, and 6 means incapacitating. What level of measurement is being used?

ordinal

Score: /1

Problem 6: Shown is a stem-and-leaf display for the exam scores of 20 statistics students. Reorganize the data as a frequency table with 5 classes of width 10. Clearly indicate for each class, the upper and lower class limits, and find frequency and relative frequency for each class. State the class boundaries and the midpoint for the first class.

5	8
6	0159
7	34555678
8	1225
9	158

Class	Frequency	Relative Frequency
50–59	1	$1/20 \approx 5.0\%$
60–69	4	$1/5 \approx 20.0\%$
70–79	8	$2/5 \approx 40.0\%$
80–89	4	$1/5 \approx 20.0\%$
90–99	3	$3/20 \approx 15.0\%$
Total	20	

Class boundaries: 49.5 to 59.5 for the first class. Class width: $60 - 50 = 10$. Class midpoint: 64.5 for the first class.

Score: /6

Problem 7: The following data represent the playing time (rounded to the nearest minute) of the 10 tunes on Jacob Collier’s Grammy Award CD:

7, 9, 7, 4, 9, 4, 3, 6, 8, 7

a. Is “playing time” a discrete or continuous variable?

continuous

b. Find the mean playing time.

6.4 minutes

c. Find the median playing time.

7 minutes

d. Find the modal playing time.

7 minutes

e. Find the sample standard deviation of the playing time. Use the computational formula

$$s = \sqrt{\frac{n \sum x^2 - (\sum x)^2}{n(n-1)}}$$

and clearly show the substitution of the values of $\sum x$ and $\sum x^2$ into the formula.

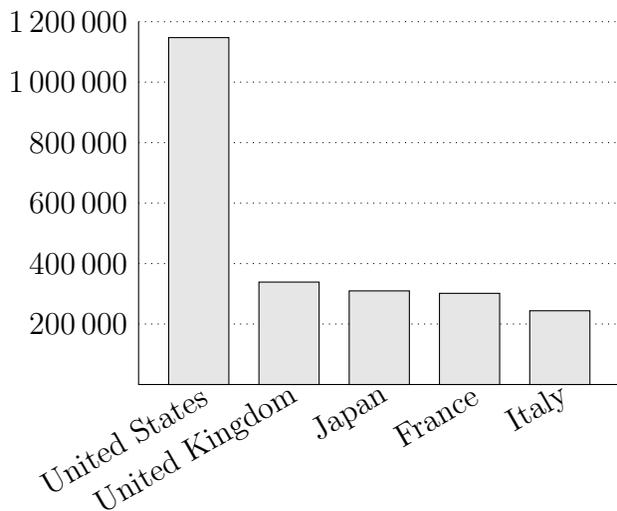
2.12

$$\sum x = 64 \text{ and } \sum x^2 = 450, \text{ so } s = \sqrt{\frac{10 \cdot 450 - 64^2}{10 \cdot 9}} = \sqrt{\frac{4500 - 4096}{90}} = \sqrt{\frac{404}{90}} \approx 2.12$$

Score: /6

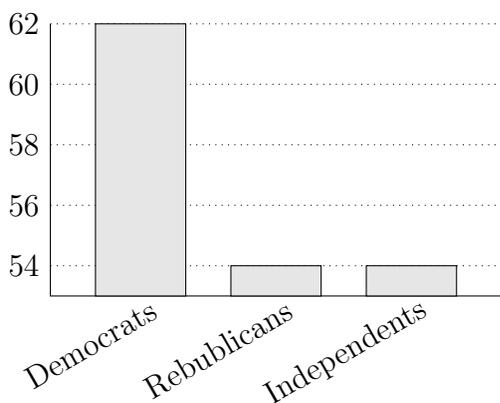
Problem 8: Comment on each graph regarding what point it's trying to make, what is misleading, and how to make the graph or its data unbiased.

FIGURE A: The top five nations in the world ranked by number of cars stolen in 2000. (The UN Office on Drugs and Crime.)



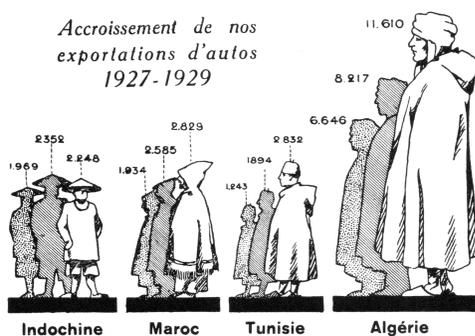
Purpose is to show that many more cars were stolen from the US. Though the vertical axis does begin with 0, the representation is biased because the US have many more citizens than the other countries, so reporting cars stolen per capita (or per car owned) would be fairer.

FIGURE B: Percentage of voters who agree with the Florida court's decision to remove the feeding tube from Terri Schiavo in 2005 by political affiliation. (CNN.com)



The purpose is to show that more Democrats supported mercy killing. The histogram is biased because the vertical axis does not begin at 0. This exaggerates the differences. The deceptive representation will be corrected by starting the vertical axis at 0.

FIGURE C: Increase in our car exports, 1927–1929. (R. Satet, *Les Graphiques* (Paris 1932))



To compare 3 years of auto exports to four countries listed on the graph. This pictograph is distracting because it is unclear if the height or area of each figure represents the data. The figures may be drawn to (some) scale for each country, but certainly not consistently between countries. (The left-hand Algerian figure should be more than twice the size of the right-hand Tunisian figure.) Use a multiple bar graph.

Score: /9

Problem 9: Shown below are the audition scores for 10 prospect trumpet students to Capilano's Jazz program.

71, 83, 58, 67, 80, 95, 78, 85, 40, 92

- a. Find the quartiles.

Sorting the data yields

40, 58, 67, 71, 78, 80, 83, 85, 92, 95

so the quartiles are 67, 79, and 85.

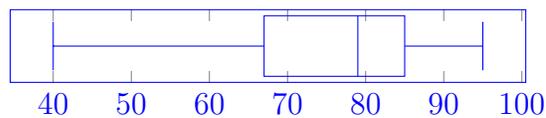
- b. Calculate the interquartile range.

$$85 - 67 = 18$$

- c. Use the IQR method to determine whether a score of 40 is an outlier.

Since $67 - 1.5 \times 18 = 40$, so 40 is not an outlier (though borderline).

- d. Construct a boxplot for the trumpet audition scores; clearly show the five-number summary on your boxplot.



Score: /7

Problem 10: The Department of Public Health reports that the mean consumption of carbonated beverages per year per Canadian is greater than 200 litres. A sample of 30 Canadians yielded a sample mean of 240 litres. Assume the standard deviation is 160 litres. Find the z -scores for the following amounts of carbonated beverage consumption.

- a. Lily consumes less than 1 litre per year. Is this unusual?

$$z = \frac{1 - 240}{160} \approx -1.493750$$

so not unusual.

- b. Kristian consumes 100 litres per year.

$$z = \frac{100 - 240}{160} \approx -0.875000$$

so still within normal range.

Score: /4