Term: 2022   Name: _____Solution Set_____

Instructor: Patricia Wrean

MATH 156-X01
Practice Test 4A

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.

GOOD LUCK!

1. (6 points) For Pat's statistics unit in Math 156, she handed out small boxes of paper clips and asked students to weigh each box of paper clips in order to find the average weight per box. For the following questions, select the best answer.

   (a) This data is
      (i) univariate
      (ii) bivariate
      (iii) multivariate
   (b) In theory, the data taken in this experiment is: (choose one)
      (i) qualitative
      (ii) quantitative and discrete
      (iii) quantitative and continuous

   (c) Consider the following list:
      (i) a box of paper clips
      (ii) the weight of a box of paper clips
      (iii) the average weight of a box of paper clips
      (iv) the weight of the boxes of paper clips that Pat handed out
      (v) the weight of the boxes of paper clips made by that company

      Which entry from the above list is the variable?   ii

      Which entry from the above list is the population?   v

      Which entry from the above list is the sample?   iv

      Which entry from the above list is the experimental unit?   i

2. (2 points) Every year, a charity polls a random selection of its members to find out what kind of fundraising events it should plan for the year. To do this, every member's name is written on a slip of paper and all of the slips are put in a big bag. The bag is mixed very thoroughly and a good-sized number of slips are drawn from the bag.

   Will this give a representative sample of the members of the charity? Explain briefly.

   yes, this is simple random sampling

3. (5 points) The six largest cities in BC are listed with their populations in the table below. The numbers have been rounded to the nearest thousand.

Abbotsford	132,000
Kelowna	181,000
Nanaimo	106,000
Vancouver	2,426,000
Victoria	363,000
White Rock	109,000

106, 109, 132, 181, 363, 2426 (in K)

median is average

range = max - min = 2426 - 106 = 2320 K

   (a) Calculate the following.

      (i) mean: *(I'd round this to $552,800) → 552,833.3̄*

      (ii) median: *156,500*
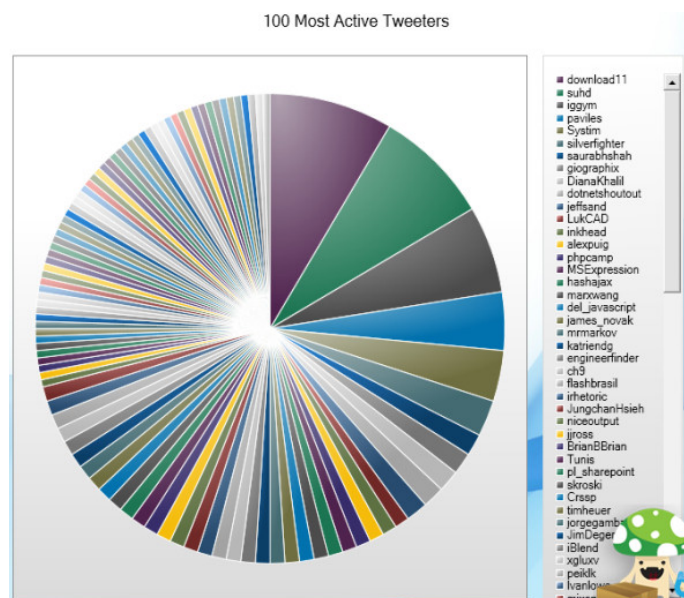
      (iii) range: *2,320,000*

   (b) Which measure of centre best describes the size of BC's largest six cities? Explain briefly.

   median, as the mean is heavily influenced by the outlier. Five of the six cities are in the range 100-400 K.

4. (2 points) The following graph is a pie chart showing the top 100 Twitter users. There is one <u>main</u> reason that this graph is badly designed. Give that reason.

   Please note that you do not need to be able to read the legend of the graph to answer this question.

   too many categories!

100 Most Active Tweeters

5. (4 points) A medical researcher wishes to study the patient outcomes for certain operations at BC hospitals within the last year. For the following situations, identify the survey method used to pick these operations.

   (a) The researcher randomly selects 10 hospitals in BC and studies all operations that occurred at those hospitals within the last year.

   cluster

   (b) The researcher makes a list of all of the operations that took place in BC within the past year and randomly chooses a certain number of operations from that list.

   simple random

6. (2 points) State whether the following studies are experimental or observational by circling the correct choice.

   (a) Sports researchers measured the resting heart rate for a random sample of Olympic speed skaters.   Expt / (Observ)

   (b) On a factory production line, the productivity of each worker was measured as well as the level of ambient lighting at the worker's station. Then the lighting level is increased and the productivity of each worker is measured again. (Expt) / Observ

7. (4 points) The mean of a distribution is 80 and the standard deviation is 10.

   (a) If you know nothing about the shape of the distribution, what can you say about the percentage of values that will fall between 40 and 120?

   Tcheby

   40   80   120 $k = 4$ std devs

   $1 - \frac{1}{k^2} = 0.9375$ $\boxed{\geq 94\%}$

   (b) If you know that the distribution is unimodal and symmetrical, what can you say about the percentage of values that will be between 70 and 90?

   70   80   90 $k = 1$

   Empirical $\boxed{\sim 68\%}$