Assignment Two

Date: 08/02/2022

Question 1

In the 2018 election for Senate in California, a CNN exit poll of 1882 voters stated that 52.5% voted for the Democratic candidate, Diane Feinstein. Of all 11.1 million voters, 54.2% voted for Feinstein.

- (a) What was the (i) subject, (ii) sample, (iii) population?
- (b) Identify a relevant statistic and corresponding parameter

Question 2

Identify each of the following variables as categorical or quantitative:

(a) Number of smartphones that you own; (b) County of residence; (c) Choice of diet (vegetarian, nonvegetarian); (d) Distance, in kilometers, commute to work

Question 3

Give an example of a variable that is (a) categorical; (b) quantitative; (c) discrete; (d) Continuous

Question 4

In analyzing data about patients who developed Covid-19 from coronavirus, many

Research studies used the scale (1 Death; 2. Hospitalized with invasive ventilation; 3. Hospitalized with non-invasive ventilation; 4. Hospitalized with supplemental oxygen; 5. Hospitalized, not requiring supplemental oxygen but requiring ongoing medical care; 6. Hospitalized, not requiring ongoing medical care (quarantine or awaiting rehab); 7. Not hospitalized, limitation on activities; 8. Not hospitalized, no limitations on activities). Is this categorical scale nominal or ordinal? Why?

Question 5

The student directory for a large university has 400 pages with 130 names per page, a total of 52,000 names. Using R software, show how to select a simple random sample of 10 names.

Question 6

According to Statistics Canada, for the Canadian population having income in 2019, annual income had a median of \$35,000 and mean of \$46,700. What would you predict about the shape of the distribution? Why?

Question 7

A sample of five data entry clerks employed in the Horry County Tax Office revised the following number of tax records last hour: 73, 98, 60, 92, and 84

- a) Find the mean, median, and the standard deviation.
- b) Compute the coefficient of skewness
- c) What is your conclusion regarding the skewness of the data?

Question 8

General Concrete, Inc., employees. It was discovered that 8 percent of the employees need

corrective shoes, 15 percent need major dental work, and 3 percent need both corrective

shoes and major dental work.

- a) What is the probability that an employee selected at random will need either corrective shoes or major dental work?
- b) Show this situation in the form of a Venn diagram.

Question 9

On New Year's Eve, the probability of a person driving while intoxicated is 0.32, the probability of a person having a driving accident is 0.09, and the probability of a person having a driving accident while intoxicated is 0.06. What is the probability of a person driving while intoxicated or having a driving accident?

Question 10

The events A and B are mutually exclusive. Suppose P(A) = .30 and P(B) = .20. What is the probability of either A or B occurring? What is the probability that neither A nor B will happen?

Question 11

A fair coin is tossed three times simultaneously. Let x denotes the number of heads appearing.

- a) Compute the expected number of heads appearing when tossing three coins simultaneously.
- b) Compute the variance and standard deviation of the number of heads appearing.

Question 12

Harrington Health Food stocks 5 loaves of Neutro-Bread. The probability distribution for the sales of Neutro-Bread is listed in the following table.

# of loaves sold	probability
0	0.05
1	0.15
2	0.20
3	0.25
4	0.20
5	0.15

a) How many loaves will Harrington sell on average?

b) What is the standard deviation for the number of loaves sold?

Question 13

If a manufacturing process has a 0.03 defective rate, what is the probability that at least one of the next 25 units inspected will be defective?

a.
$$\binom{25}{1}(0.03)^1 * (0.97)^{24}$$

b. $1 - \binom{25}{1}(0.03)^1 * (0.97)^{24}$
c. $1 - \binom{25}{0}(0.03)^0 * (0.97)^{25}$

Question 14

Automobiles arrive at the Elkhart exit of the Indiana Toll Road at the rate of two per minute. The distribution of arrivals approximates a Poisson distribution.

- a) What is the probability that **no automobiles** arrive in a particular minute?
- b) What is the probability that **at least one automobile arrives** during a particular minute?

Question 15

A normal population has a mean of 20.0 and standard deviation of 4.

- a. Compute the z-value associated with 25.0
- b. What proportion of the population is between 20 and 25.
- c. What proportion of the population is less than 18.

Question 16

Suppose that the birth weight of Somali babies has a normal distribution with mean μ =3.4 and standard deviation σ =0.35.

- a) Find the probability that a randomly chosen Somali baby has a birth weight between 3.5 and 4.0 kg.
- b) What is the percentage of Somali babies who have a birth weight between 3.5 and 4.0 kg?

Question 17

For a medical study, a researcher wishes to select people in the middle 60% of the population based on blood pressure. If the mean systolic blood pressure is 120 and the standard deviation is 8, find the upper and lower readings that would qualify people to participate in the study.

Question 18

Suppose the average price paid for particular vehicle is \$92,450 and the standard deviation is \$1,275. Assume that the price tends to follow the pattern of a normal distribution. Find each of the following:

a. What is the probability that a buyer will pay more than \$93,000?

b. At what price will 95% of the buyers pay more?

Question 19

A report indicates that public school teacher's annual salaries in New York city have an approximate mean of \$69,000 and standard deviation of \$6,000. If the distribution has approximately a bell shape, report intervals that contain about (**a**) 68%, (**b**) 95%, (**c**) all or nearly all salaries. Would a salary of \$100,000 be unusual? Why?

Question 20

A systematic random sample of n subjects from a population of size N selects a subject at random from the first k = N/n in the population list and then selects every kth subject listed after that one. Explain why this is not a simple random sample.

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