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Quiz 5

PART 1

MULTIPLE CHOICE QUESTIONS: Two marks for each question 1 to 14. Some of the numbers in the provided choices have been rounded.

Question 1: (2 Points)

The Gallup Poll has decided to increase the size of its random sample of Canadian voters from about 1500 people to about 4000 people. The effect of this increase is to:

- reduce the bias of the estimate.
- increase the standard error of the estimate.
- reduce the variability of the estimate.
- increase the confidence interval width for the parameter.
- have no effect because the population size is the same.

Question 2: (2 Points)

An airplane is only allowed a gross passenger weight of 8000 kg. If the weights of passengers traveling by air between Montreal and Vancouver have a mean of 78 kg and a standard deviation of 7 kg, the approximate probability that the combined weight of 100 passengers will exceed 8,000 kg is:

- 0.4978
- 0.3987

- 0.1103
- 0.0044
- 0.0022

Question 3: (2 Points)

The time required to assemble an electronic component is normally distributed with a mean of 12 minutes and a standard deviation of 1.5 min. Find the probability that the time required to assemble all nine components (i.e. the total assembly time) is greater than 117 minutes.

- 2514
- 0.2486
- 0.4772
- 0.0228
- 0.0013

Question 4: (2 Points)

A wholesale distributor has found that the amount of a customer's order is a normal random variable with a mean of $200 and a standard deviation of $50.

What is the probability that the total amount in a random sample of 20 orders is greater than $4500?

- 0.1915
- 0.0125
- 0.3085
- 0.0228
- 0.4875

Question 5: **Which of the following statements is INCORRECT about the sampling**

distribution of the sample mean?

(2 Points)

- The standard error of the sample mean will decrease as the sample size increases.
- The standard error of the sample mean is a measure of the variability of the sample mean among repeated samples.
- The sample mean is unbiased for the true (unknown) population mean.
- The sampling distribution shows how the sample mean will vary among repeated samples.
- The sampling distribution shows how the sample was distributed around the sample mean.

Question 6: **The sample mean is an unbiased estimator for the population mean. This means:**

(2 Points)

- The sample mean is always equal to the population mean.
- The average sample mean, over all possible samples, equals the population mean.
- The sample mean is always very close to the population mean.
- The sample mean will only vary a little from the population mean.
- The sample mean has a normal distribution.

Question 7: **Which statement is NOT CORRECT?**

(2 Points)

- The sample standard deviation measures variability of our sample values.
- A larger sample will give answers that vary less from the true value than smaller samples (assuming both are properly chosen).
- The sampling distribution describes how our estimate (answer) will vary if a new sample is taken.
- The standard error measures how much our estimate (answer) may vary if a

new sample of the same size is chosen using the same sampling method.

- A large sample size always gives unbiased estimators regardless of how the sample is chosen.

Question 8:

(2 Points)

The average monthly mortgage payment for recent home buyers in Quebec City is μ = $732, with standard deviation of σ = $421 A random sample of 125 recent home buyers is selected. The approximate probability that their average monthly mortgage payment will be more than $782 is:

- 0.9082
- 0.4522
- 0.4082
- 0.0478
- 0.0918

Question 9:

(2 Points)

Can of tuna have a nominal net weight of 250 g. However, due to variation in the canning process, the actual net weight has an approximate normal distribution with a mean of 255 gram and a standard deviation of 10g. According to Consumer Affairs, a sample of 16 tins should have less than a 5% chance that the mean weight is less than 250 g.

What is the actual probability that a sample of 16 tins will have a mean weight less than 250 g?

- 0.1915
- 0.3085
- 0.0228
- 0.4772
- 0.0500

Question 10: **The Central Limit Theorem states that:**

(2 Points)

- if n is large then the distribution of the sample can be approximated closely by a normal curve
- if n is large, and if the population is normal, then the variance of the sample mean must be small.
- if n is large, then the sampling distribution of the sample mean can be approximated closely by a normal curve
- if n is large, and if the population is normal, then the sampling distribution of the sample mean can be approximated closely by a normal curve
- if n is large, then the variance of the sample must be small.
- random sample of size n = 30 is taken from a population of size N = 300.Which statement is generally correct?
- **?** is an estimate of X bar (sample mean); s is an estimate of s.
- X is an estimate of **?**; s is an estimate of s.
- **?** is an estimate of X bar (sample mean); s is an estimate of the standard deviation of the sample mean.
- X bar (sample mean) is an estimate of **?**; s is an estimate of the standard deviation of the sample mean.
- X bar (sample mean) is an estimate of **?**; s is the standard error of the sample mean.

Question 11: **A random sample of size n = 30 is taken from a population of size N = 300.**

(2 Points) **Which statement is generally correct?**

- μ is an estimate of X bar (sample mean); σ is an estimate of s.
- X is an estimate of μ; s is an estimate of σ.

- μ is an estimate of X bar (sample mean); s is an estimate of the standard deviation of the sample mean.
- X bar (sample mean) is an estimate of μ; s is an estimate of the standard deviation of the sample mean.
- X bar (sample mean) is an estimate of μ; s is the standard error of the sample mean.

Question 12: (2 Points)

The Central Limit Theorem is important in Statistics because it allows us to use the normal distribution to make inferences concerning the population mean:

- provided that the population is normally distributed and the sample size is reasonably large.
- provided that the population is normally distributed (for any sample size).
- provided that the sample size is reasonably large (for any population).
- provided that the population is normally distributed and the population variance is known (for any sample size).
- provided that the population size is reasonably large (whether the population distribution is known or not).

Question 13: (2 Points)

One of COMM 215 class decided to estimate the proportion of cars that are red in a parking lot. They took a random sample of the cars in the closest parking lot to the class. Which of the following is NOT correct?

- Even though the sample was random sample of cars in the parking lot, the sample may not be representative of the population of cars driven by Concordia students because the decision to park in B-lot is a self-selected sample.
- If another sample of cars was taken, it is likely that a different proportion for Japanese made cars would be found. The set of all possible values for the proportion is known as the sampling distribution.
- The confidence interval computed refers to the proportion of cars in the sample that were red.

- The sample was a simple random sample from cars parked. This means that every car in the lot had an equal chance of being selected.
- A convenience sample could be chosen by selecting the first 25 cars in the parking lot that are closest to the MB Building

Question 14: **Which of the following statements is NOT CORRECT?**

(2 Points)

- In a proper random sampling, every element of the population has a known (and often equal) chance of being selected.
- The precision of a sample mean or sample proportion depends only upon the sample size (and not the population size) in a proper random sample.
- Convenience sampling often leads to biases in estimates because the sample is often not representative of the population.
- If a sample of 1,000,000 families is randomly selected from all of Canada (with about 8,000,000 families) and the average family income is computed, then the true value of the family income for all families in Canada is known.
- The sampling distribution of the sample mean describes how the sample mean will vary among repeated samples.

PART 2

FILL IN THE BLANKS QUESTIONS. Three marks for each question 15 to 20.

NUMERICAL answers only

Solve a given problem and in the blank space provided, **enter the NUMERICAL ANSWER ONLY. You MUST round your Final answers to 3 decimal places to avoid system marking errors.**

Question 15: **In this city, the mean annual cost of an automobile insurance is $1250 with a standard deviation of $100.**

(1 Points)

What is the probability that a random sample of 81 automobile insurance policies will have a sample mean within $20 of the population mean?

Question 16:

(1 Points)

The Mayor of a city is considering setting up an advisory panel that helps formulate policy for its parks and recreation facilities. Records show that forty-five percent of registered voters in the city are members of the Mayor's party and the rest are from the opposition parties. If a random sample of 400 members is taken from the residents of the city, what is the probability that 38% to 42% of the constituency of the advisory panel will be from the mayor's party?

Question 17:

(1 Points)

A manufacturing process is operating properly if the lengths of an important subcomponent are normally distributed with mean of 120 cm and a standard deviation of 8 cm. A process is deemed improper if the mean length for a random sample of four subcomponents differ from the expected length by more than its standard deviation. If four subcomponents are randomly selected, find the probability that their mean length exceeds 128 cm.

Question 18:

(1 Points)

A movie rental franchise recently decided to allow rental of videos for three nights rather than one. The decision was based on a study that suggested at least 72% of the customers would return the video by the second night anyway. A sample of 600 customers found 70% returned the movie prior to the third night.

What is the probability of a sample result with 70% or fewer returns prior to the third night?

Questions 19 and 20 are based on the following:

Air travel time between two cities is normally distributed with a mean of an hour and 40 minutes and a standard deviation of 10 minutes. Consider a random sample of 25 flights between the two cities.

Question 19: **How long is an average flight in minutes if it takes longer than 99.38% of all other flights between the two cities?**

(3 Points)

Question 20: **If a scheduled average flight time is 1.5 hours, what is the probability of flights that are more than twelve minutes late?**

(3 Points)

- END OF QUIZ -

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