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**Answer 1(a)**

**n 1 = 50 , n 2 = 28**

**x̅1 = 5.5, x̅ 2 = 6.7**

**S1 = 9, S2 = 16**

**C.I =80%** $∝$ **= 20% =0.2**

$\frac{∝}{2}$ **= 1.2928**

**S.P =** $\sqrt{\frac{(n1-1) s1 + (n2-1) s2}{(n1 +n2 -2)}}$

**S.P =** $\sqrt{\frac{(49) (9) + (27) (16)}{76}}$

**S.P =** $\sqrt{\frac{441 + 432}{76}}$

**S.P = 3.38**

**(x̅1 - x̅2)** $\frac{∝}{2}$ **SP** $\sqrt{\frac{1}{n1}} + \frac{1}{n2}$$< μ1 -μ2 <(x̅1-x̅2)+\frac{∝}{2}$ **SP** $\sqrt{\frac{1}{n1}}$ **+** $\frac{1}{n1}$

**(5.5 – 6.7) – (1.2928 x 3.38** $\sqrt{\frac{1}{50}+ \frac{1}{28}}$$< μ2 < ($**5.5-6.7) + (1.2928)**

**(-1.2) – (1.03) <** $μ1 -μ2 <$ **(-1.2) + (1.03)**

**-2.23** $< u1 -u2 <$ **- o.17**

**Answer 1 (b)**

 Z – test and t- tests are statistical methods involving data analysis that have applications in business, science, and many other disciplines. Let's explore some of their differences.

👉🏻 A t-test is a statistical method used to see if two sets of data are significantly different.

👉🏻 t-test asks whether a difference between the means of two groups is unlikely to have occurred because of random chance.

 t-tests are most appropriate when dealing with problems with a limited sample size (*n* < 30).

👉🏻Population variance is unknown.

👉🏻A z-test is a statistical test to help determine the probability that new data will be near the point for which a score was calculated.

👉🏻 The z-score tells you how far, in standard deviations, a data point is from the mean or average of a data set.

👉🏻A z-test compares a sample to a defined population and is typically used for dealing with problems relating to large samples (*n* > 30).

👉🏻 Population variance should be known or assumed to be known.

**Answer 2(a)**

**n=250 x= 107**

**C.I = 90%,** $α=$**10% =0.0** $\frac{∝}{2}= $**0.05**

**1- 0.05= o.95**

**P=** $\frac{x}{n}$ **=** $\frac{107}{250 }$ **= 0.428**

**P= 2** $\frac{∝}{2}$$\sqrt{\frac{p(1-p)}{n}}$$< $**/\** $<$ **p+2** $\frac{∝}{2}$$\sqrt{\frac{p(1-p}{n}}$

**(0.428) – (1.65)** $\sqrt{\frac{0.428(0.572)}{250}}$$<$ **/\** $<$ **0.428+1.65**

$\sqrt{\frac{0.428(0-572)}{250}}$

**0.428- (1.65) (0.0312)** $< /\ <$ **0.428 + (1.65) (0.0312)**

**0.376** $< /\ <$ **0.479**

**Answer 2(b)**

Statisticians have to use estimation to describe and take information from gathered.

👉🏻Point estimation is a type of estimation that uses a single value, a sample statistic, to infer information about the population. Point estimation can be a sample statistic.

👉🏻 It gives us a particular value as an estimate of the population parameter.

point estimate is not absolutely accurate. It is an estimate based on only a single random sample. If repeated random samples were taken from the population, the point estimate would be expected to vary from sample to sample.

Interval estimation

👉🏻 interval estimation is the use of sample data to calculate an interval of possible values of an unknown population parameter.

👉🏻 An interval is a range of values for a statistic. For example, you might think that the mean of a data set falls somewhere between 10 and 100.

Interval estimation is defined by two numbers, between which a population parameter is said to lie. For example, *a* < μ < *b* is an interval estimate for the population mean μ. It indicates that the population mean is greater than *a* but less than *b*.

**Answer 3(a)**

 = 1000 , n=100 , x=870,000 C.I = 90% C.I=98%

1-0.05 = 0.95

Zα/2 = 1.6 +0.05=1.65

X-Zα/2 . /$\sqrt{n}$ ≤ µ ≤ X + Zα/2 . /$\sqrt{n}$

870,000-1.65 (1000/10) ≤ µ ≤ 870,000 + 1.65 (1000/10)

869835 ≤ µ ≤ 870165

870,000 -2.33 (100) ≤ µ ≤ 870,000 + 2.33 (100)

869,767 ≤ µ ≤ 870,233 answer

**Answer 3 (b)**

Effect of Changing the confidence level increasing the confidence level increases the error bound, making the confidence interval wider. Decreasing the confidence decreases the error bound, making the confidence interval narrower. Or in simple words Increasing the confidence will increase the margin of error resulting in a wider interval Increasing the confiednce will decrease the margin of error resulting in a narrower

**Answer 4 (a)**

Explaining confidence interval in few lines;

Confidence interval is a range of value we are sure our true values lie in .confidence interval, in statistics, refers to the probability that a population parameter will fall between two set values for a certain proportion of times. Confidence intervals measure the degree of uncertainty or certainty in a sampling method. A confidence interval can take any number of probabilities, with the most common being a 95% or 99% confidence level.

**Confidence level**refers to the percentage of probability, or certainty, that the confidence interval would contain the true population parameter when you draw a random sample many times. Or, in the vernacular, "We are 99% certain (confidence level) that most of these datasets (confidence intervals) contain the true population parameter.

**Answer 4(b)**

N=12

X= 7.5

ó= 2.4

C.I= 99

α= 1= 0.01

α/2= 0.005

1-0.005. 0.995

Z α/2 = 2.58

7.3- 2.58 (2.4÷3.46) < µ < 7.3 + 2.58 (2.4÷3.46)

7.3-1.79 < µ < 7.3 + 1.79

5.51 < µ < 9.09

**Q5:** Fill in the blanks. **(10)**

**1.** The probability of any event is between **zero** and **one**

2**.** As sample size increases. So the margin of error (e) will **DECREASE**.

3. Assuming the variable is normally distributed and the population standard deviation (σ) is unknown,you are conducting a **t-test** test for a mean.

4. In two to three complete sentences, explain what a confidence interval means (in general), as if you were talking to someone who has not taken statistics **Answer = Confidence intervals are a family of statistical techniques that emerge, often in unexpected situations, in your personal and professional lives. Whether you are looking for references to blood tests or risk levels when entering a new business line, confidence intervals enable you to summarize data in a way that reflects the outcome**

5.A sample of 20 heads of lettuce was selected. Assume that the population distribution of head weight is normal. The weight of each head of lettuce was then recorded. The mean weight was 2.2 pounds with a standard deviation of 0.1 pounds. The population standard deviation is known to be 0.2 pounds.

Identify the following:

1. x¯ = 2.2
2. σ = 0.2
3. n = 20

6.Suppose that a committee is studying whether or not there is waste of time in our judicial system. It is interested in the mean amount of time individuals waste at the courthouse waiting to be called for jury duty. The committee randomly surveyed 81 people who recently served as jurors. The sample mean wait time was eight hours with a sample standard deviation of four hours.

* 1. x¯ = 8
	2. sx = 4
	3. n = 81
	4. n – 1 = 80

7. Estimate expressed by the single value is **point estimate**

**8.** What is the standard deviation of a sampling distribution called?

**Standard error**

9. Hypothesis testing and estimation are the two key branches of the field of inferential statistics? **True**

10. As a general rule, researchers tend to use **95%** percent confidence intervals