Second Year - Term II
Systems & Biomedical Eng. Department
Cairo University

Spring Semester
Date: April 2022
Page 1 of 2

Biostatistics: Sheet 5 –
Statistical Intervals

1. A confidence interval estimate is desired for the gain in a circuit on a semiconductor device. Assume that gain is normally distributed with standard deviation $\sigma = 20$, $\bar{x} = 1000$.
   a. Find a 95% CI for μ when $n = 10, 25$.
   b. Find a 99% CI for μ when $n = 10, 25$.
   c. How large must n be if the length of the 95% CI is to be 40?

2. Find a 99% confidence interval for the true population average from which the sample S={229, 255, 280, 203, 229} is randomly selected.

3. A study of 45 golfers showed that their average score on a particular course was 92. The standard deviation of the sample is 5. Find the 95% confidence interval of the mean score for all golfers.

4. A restaurant owner wishes to find the 99% confidence interval of the true mean cost of French fries. How large should the sample be if he wishes to be accurate within 0.1 L.E? A previous study showed that the standard deviation of the price was 0.12 L.E.

5. $n = 100$ random samples of water from a fresh water lake were taken and the calcium concentration (mg/lit) measured. A 95% CI on the mean calcium concentrations is $0.49 \le \mu \le 0.82$.
   a. Would a 99% CI calculated from the same sample data been longer or shorter?
   b. Consider the following statement: There is a 95% chance that μ is between 0.49 and 0.82. Is this statement correct? Explain your answer.
   c. Consider the following statement: If $n = 100$ random samples of water from the lake were taken and the 95% CI on μ computed, and this process was repeated 1000 times, 950 of the CIs will contain the true value of μ. Is this statement correct? Explain your answer.

6. The brightness of a television picture tube can be evaluated by measuring the amount of current required to achieve a particular brightness level. A sample of 10 tubes results in and $s = 15.7$. Find (in microamps) a 99% confidence interval on mean current required.

7. A recent study on 100 people in Cairo found 27 was obese. Find the 90% confidence interval of the population proportion of individuals living in Cairo who are obese.

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Page 2 of 2

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8. A random sample of 50 suspension helmets used by motorcycle riders and automobile race-car drivers was subjected to an impact test, and on 18 of these helmets some damage was observed.
   a. Find a 95% two-sided confidence interval on the true proportion of helmets of this type that would show damage from this test.
   b. Using the point estimate of p obtained from the preliminary sample of 50 helmets, how many helmets must be tested to be 95% confident that the error in estimating the true value of p is less than 0.02?
   c. How large must the sample be if we wish to be at least 95% confident that the error in estimating p is less than 0.02, regardless of the true value of p (*i.e. assume 50% proportion*)?

Level of confidence 1-a	a/2	$z_{\frac{\alpha}{2}}$
90%	5%	1.645
95%	2.5%	1.96
98%	1%	2.33
99%	0.5%	2.575