Assignment-Solutions
Inferential Statistics

1. If we want to be very certain we capture the population parameter, what type of interval should be used, a wider interval or a smaller interval?

   Solution: Smaller Interval

2. With a simple random sample of 25 a particular species of retiles and measure their tails. The mean tail length of the sample is 5 cm. Assume 0.2 cm is the standard deviation of the tail lengths of the reptiles in sample of the population, then what is a 95% confidence interval for the mean tail length of all reptiles in the population?

   Solution: Here the population standard deviation is not known, only the sample standard deviation is known.

   Thus we will use a table of t-scores.
   When we use a table of t scores we need to know how many degrees of freedom we have.

   In this case there are 24 degrees of freedom, which is one less than sample size of 25.

   $(n-1) = 25-1 = 24$

   The value of t that corresponds to a 90% confidence interval is 1.71. By using the formula for the margin of error
   $= 5 – 1.71(0.2/5)$ to $5 + 1.71(0.2/5)$.
   = 4.932 cm to 5.068 cm

   as a confidence interval for the population mean.

3. From a popular brand of cosmetics with a known standard deviation of 2.76, a sample of size 52 is drawn and from that sample a sample mean=–22.8 is taken. Find the 95.0% confidence interval for that statistics

   Solution: The standard deviation of the sample means will be

   $2.76 / \sqrt{52}$

The **z-score** corresponding to 95% is 1.96. Therefore, confidence interval will be the interval from $\bar{x} - 1.96 * 2.76 / \sqrt{52}$

to $\bar{x} + 1.96 * 2.76 / \sqrt{52}$

= $\bar{}$22.8–1.96*X and $\bar{}$22.8+1.96*X

4. A microchip manufacturing company produces microprocessors used for electronic applications. If a manufacturer takes a random sample of 200 devices and notices 19 of them are defective. Construct 95% confident interval around the true population defective.

Solution: x =19

n = 200

p-hat = 19 /200 = 0.095

$$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

= p-hat = 1- p-hat = 1-0.095 = =0.905

95% confidence Interval

$\propto$ =1 – 0. 95 =0.05

$\propto_{0.05/2} = \propto_{0.025}$ =1.96

$0.096 \pm 1.96\sqrt{(0.095)}(0.905)/200$

$= 0.06436 \leq p \leq 0.13564$

5. 28 successes in 70 independent Bernoulli trials were observed. Compute a 90% confidence interval for the population proportion p?

Solution: Sample proportion p-hat = 28 /70 = 0.4

n = 70

The 90 % confidence interval for p is

$0.4 + (1.64)\frac{\sqrt{(0.4)(0.6)}}{70} = 0.304$

$0.4 - (1.64)\frac{\sqrt{(0.4)(0.6)}}{70} = 0.496$

Hence the answer is [0.304 ,0.496]