3.2 Assignment Statistics

**Practical Application of CLT**

5. Problem Statements

1 .Engineers must consider the breadths of male heads when designing motorcycle helmets for men. Men have head breadths that are normally distributed with a mean of 6.0 inches and a standard deviation of 1.0 inch

If one male is randomly selected, what is the likelihood that his head breadth is less than 6.2 inches?

**Answer:**

Z = data value – mean / standard deviation

Z = (6.2 - 6.0)/1

Z = 0.2

P( x< 6.2) = P ( Z < 0.2)

= 0.5793 (From Z Table)

2. The Safeguard Helmet Company plans an initial production run of 100 helmets. How likely is it that 100 randomly selected men have a mean head breathe of less than 6.2 inches?

**Answer:**

Z = data value – mean / standard deviation

Standard deviation = sigma/Square root (n)

Z = (6.2 – 6.0)/1/10

Z = 0.2/1/10

Z = 2

P( x< 6.2) = P ( Z < 2)

= 0.9772 (From Z Table)

3. The production manager sees the result in part b and reasons that all helmets should be made for men with head breadths of less than 6.2 inches, because they would fit all but a few men. What is wrong with that reasoning?

**Answer:**

From the first answer, it is clear that close to 42% (1 – 0.5793) of men would have head breadth more than 6.2 inches, which would mean if the production manager goes with the 2nd solution, then it would be an wrong assessment

**Two-tailed Test Of Population Mean with Known Variance**

2. Suppose the mean weight of King Penguins found in an Antarctic colony last year was 15.4 kg. In a sample of 35 penguins same time this year in the same colony, the mean penguin weight is 14.6 kg. Assume the population standard deviation is 2.5 kg. At .05 significance level, can we reject the null hypothesis that the mean penguin weight does not differ from last year?

Answer:

Mean = 14.6

Mu0 = 15.4   
Standard Deviation = 2.5              
n = 35   
z = (Mean – Mu0)/ (Standard Deviation /SQRT (n))   
z = −1.89

Alpha= .05   
Critical value at .05 Significance level is 1.64

The test statistic -1.89 lies below 1.64. Hence, at .05 significance level, we do *not*reject the null hypothesis that the mean penguin weight does not differ from last year.