**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

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

b.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 breath of less than 6.2 inches?

c. 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? Two-tailed Test Of Population Mean With Known Variance

given

mean =6

Std Dev =1

**Answer a.**

P(x < 6.2) using the normal distribution and the given parameters:

p = p-norm ( 6 . 2 , mean =µ, sd = ƍ )

s i g n i f ( p= 3 )

[ 1 ] 0. 5 7 9

**Answer b**

n = 100

s t d . e r r = sigma / s q r t ( n )

p = pnorm ( 6 . 2 , mean = µ, sd = s t d . e r r )

s i g n i f ( p , 3 ) [ 1 ] 0. 9 7 7

**Answer c**

a in P(x < a) = 0.95,

therefore use the inverse normal cumulative distribution using the given parameters for the population a = qnorm ( 0 . 9 5 , mean = µ, sd = ƍ )

s i g n i f ( a , 3 )

[ 1 ] 7. 6 4

Thus, the largest size male head breath the helmet will fit is 7.64 in.

**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?

H0: μ = 15.4. We begin with computing the test statistic.

x̅ = 14.6             
µ0 = 15.4

ƍ = 2.5                 
n = 35                  
t = (x̅− µ0)/( ƍ /sqrt(n))   
t                         
[1] −1.8931

We then compute the critical values at .05 significance level.

α= .05   
t.half. α

= qt(1− α /2, df=n−1)   
c(−t.half. α, t.half. α)   
[1] −2.0322  2.0322

Answer

The test statistic -1.8931 lies between the critical values -2.0322, and 2.0322. Hence, at .05 significance level, we do not reject the H0 , the mean penguin weight does not differ from last year.