Classwork 4

DS 413/613 CLASSWORK/LAB Review of Basic Statistics

Instruction: Generate and email an Rmarkdown File and a Word file that shows all required script, code, and output.

1. Calculus 1 Test Scores are normally distributed with a mean of 73 and a standard deviation of 4 1a) Show and use R code to find the probability that a score is below 70

pnorm(70, mean=73, sd=4)

## [1] 0.2266274

1b) Show and use R code to find the probability that a score that is above 81

1 - pnorm(81, mean=73, sd=4)

## [1] 0.02275013

1c) Show and use R code to determine the proportion of scores that are greater than or equal to 68 but less than or equal to 75.

pnorm(75, mean=73, sd=4) - pnorm(68, mean=73, sd=4)

## [1] 0.5858127

1d) Show and use R code to find the score for which 63% of the scores are less than.

qnorm(.63, 73,4)

## [1] 74.32741

1. In three or four sentences explain how the graph of the normal distribution differs from the graph of the t distribution.

T-distribution is similar to the normal distribution because it is bell-curved as well. However, it has thicker tails and is always centered at 0. The one parameter for t-distributions is called “degrees of freedom.” This parameter determines how thick the tail is.

1. A normal distribution has a mean of 20 and a standard deviation of 3.75. Use and show R code to find the height of the curve at the value of 17.

dnorm(x = 17, mean = 20, sd = 3.75)

## [1] 0.07725108

1. A t distribution curve has 3 degree of freedom. Find the height of the curve at the t value of 1.75.

dt(x = 1.75, df = 3)

## [1] 0.09000331

1. Table 1: Grams of protein in random sample of energy bars Energy Bar - Grams of Protein 20.70 27.46 22.15 19.85 21.29 24.75 20.75 22.91 25.34 20.33 21.54 21.08 22.14 19.56 21.10 18.04 24.12 19.95 19.72 18.28 16.26 17.46 20.53 22.12 25.06 22.44 19.08 19.88 21.39 22.33 25.79

5a) Create a vector for the data in the table and assign the vector to the variable V.

V <- c(20.70, 27.46, 22.15, 19.85, 21.29, 24.75,  
20.75, 22.91, 25.34, 20.33, 21.54, 21.08,  
22.14, 19.56, 21.10, 18.04, 24.12, 19.95,  
19.72, 18.28, 16.26, 17.46, 20.53, 22.12,  
25.06, 22.44, 19.08, 19.88, 21.39, 22.33, 25.79)

5b) Using and showing R code perform a one sample t test for null and alternative hypotheses given below: Ho : µ = 20 , Ha : µ > 20

t.test(V,mu=20, alternative = "greater", conf.level = .95)

##   
## One Sample t-test  
##   
## data: V  
## t = 3.0668, df = 30, p-value = 0.002276  
## alternative hypothesis: true mean is greater than 20  
## 95 percent confidence interval:  
## 20.62521 Inf  
## sample estimates:  
## mean of x   
## 21.4

5c) What is the p value? 0.002276

5d) What is the 95% confidence interval? (20.62521, Inf)

5f) Use the p value to determine if the null hypothesis should be rejected. Since the p-value is low (statistically significant), we reject the null hypothesis

5g). Use the confidence interval to determine if the null hypothesis should be rejected. Since 20 is not within the confidence interval, we reject the null hypothesis that 20 is the true mean.