Statistics 140 Winter 17

Hand-In Assignment #1

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1. (10 pts total) Motorola claims the time to charge a completely discharged phone using its turbo charger is normally distributed with a mean of 15 minutes and a standard deviation of 0.75 minutes. Brandon goes to a local Verizon store and asks the clerk to select a new turbo charger at random for him to purchase. Brandon takes the charger home, completely discharges his phone and then plugs his phone into the new charger until it is fully charged. Let X = time to fully charge Brandon’s phone.
   1. Find the probability that the time to completely charge Brandon’s phone is at most 16 minutes. (2 pts)

R Code: > #Use pnorm(x,mean,sd)

>lower1 = pnorm(16, mean = 15, sd = 0.75)

> lower1

**Answer** [1] **0.9087888**

* 1. Find the probability that the time to completely charge Brandon’s phone is more than 16 minutes. (2 pts)

R Code: > #Use pnorm(x,mean,sd,lower=FALSE) to get the upper tail

> upper1 = pnorm(16,15,0.75, lower = FALSE)

> upper1

**Answer** [1] **0.09121122**

* 1. Find the probability that the time to completely charge Brandon’s phone is between 14.0 and 16.0 minutes. (4 pts)

R Code: > #Use pnorm(x1,mean,sd)-pnorm(x2,mean,sd), Upper vs Lower limit

> between <- pnorm(16,15,0.75) – pnorm(14,15,0.75)

> between

**Answer** [1] **0.8175776**

* 1. Find the 95th percentile (i.e., find x such that P(X ≤ x) = 0.95). (2 pts)

R Code: > #Use qnorm(quantile,mean,sd)

> quartile95 <- qnorm(0.95, mean = 15, sd = 0.75)

> quartile95

**Answer** [1] **16.23364**

1. (10 pts total) According to a recent survey, 55% of iPhone 7 Plus users prefer the new jet black color. A random sample of 28 iPhone 7 Plus users is selected. Let X = # of iPhone 7 Plus users that prefer the jet-black color. Use this information to complete the following.
   1. What is the probability that exactly 15 of the iPhone 7 Plus users prefer the jet-black color? (2 pts)

R Code: > #Use dbinom(x,size = sample size ,prob = probability of success)

> exactly15 <- dbinom(15,28,0.55)

> exactly15

**Answer** [1] **0.148103**

* 1. What is the probability that no more than 15 of the iPhone 7 Plus users prefer the jet-black color? (2 pts)

R Code: > #Use pbinom(x,size = sample size ,prob = probability of success)

> nomorethan15 <- pbinom(15, size = 28, prob = 0.55)

> nomorethan15

**Answer** [1] **0.5125423**

* 1. What is the probability that between, and including, 17 and 20 of the iPhone 7 Plus users prefer the jet-black color? (4 pts)

R Code: > #P(17 <= X <= 20) = P(X <=20) – P(X < 17) = P(X <= 20) – P(X <= 16)

> #Calculate between17and20 = P(X <= 20) – P(X <= 16)

> between2 <- pbinom(20,size=28,prod=0.55) – pbinom(16,size=28,prob=0.55)

> between2

**Answer** [1] **0.3161592**

* 1. How many of the iPhone 7 Plus users would you expect to prefer the jet-black color? (2 pts)

**Answer: 55% of iPhone 7 Plus users would prefer the jet-black color or n\*p = 0.55\*28 = 15.4.**

1. (15 pts total) The Labrador Retriever (Labrador or Lab, for short) is one of several breeds of retriever. Typically, Labradors are athletic and love to swim, play catch and retrieve games, and are very loving, kind, loyal and compassionate. Labradors can easily become overweight, due to their enjoyment of treats, hearty appetites, and endearing behavior towards people. The following data represents the weights of 20 randomly selected healthy 4-year-old male Labs.

81 85 93 93 99 76 75 84 74 88

78 81 84 82 89 81 96 82 84 86

* 1. Find the mean, median, variance and standard deviation for the weight of the 4-year-old male Labs. (4 pts)

R Code:

> x <- c(81,85,93,93,99,76,75,84,74,88,78,81,84,82,89,81,96,82,84,86)

> mean(x)

**Answer** [1] **84.55**

> median(x)

**Answer** [1] **84**

> var(x)

**Answer** [1] **46.68158**

> sd(x)

**Answer** [1] **6.832392**

* 1. Find a 95% confidence interval for the true mean weight of the 4-year-old male Labs. (4 pts)

R Code:

> t.test(x, alternative="two.sided",conf.level=0.95)

One Sample t-test

data: x

t = 55.342, df = 19, p-value < 2.2e-16

alternative hypothesis: true mean is not equal to 0

95 percent confidence interval:

81.35234 87.74766

sample estimates:

mean of x

84.55

**Answer = (81.35234, 87.74766)**

* 1. 84.55 Interpret the interval in part (ii). (1 pts)

**Answer: A 95% confidence interval for the mean weight for four-year-old Labs is between 81.35234 and 87.74766 pounds. We are 95% sure that the mean weight of four-year-old Labs is between 81.35234 and 87.74766 pounds.**

* 1. A claim is made the true mean weight of the 4-year-old male Labs is 85 pounds. Based on the interval in part (ii), can one reject this claim? Justify your answer! (2 pts)

**Answer: No, you cannot reject this claim because 85 lbs. is in the 95% confidence interval and this means that we are 95% sure that the mean is in the confidence interval and 85 pounds is in that interval**.

* 1. Test the hypothesis that the true mean weight is 85 pounds. (Be sure to include all the steps!) (4 pts)

**Ho: μ = 85**

**Ha: μ ≠ 85**

R Code:

> t.test(x,mu=85,alternative="two.sided",conf.level=0.95)

One Sample t-test

data: x

t = -0.29455, df = 19, p-value = 0.7715

alternative hypothesis: true mean is not equal to 85

95 percent confidence interval:

81.35234 87.74766

sample estimates:

mean of x

84.55

**Test Statistic: -0.29455**

**p-value: 0.7715**

**Since the p-value is greater than α =0.05, we do not reject H0**

**It is not reasonable to assume that the true mean weight of the four-year-old male Labs is significantly different from 85 pounds.**