Homework #1\_FA2024\_BMEN7340

Student First\_Last\_7340\_HW1\_FA24

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# Question #1

In a given vector: birthweight <- c(3600,1700,4000,3900,3100,3800,2200,3000)  
Find the mean, median, min, max, 1st, and 3rd quartiles using a single R syntax.  
Use a single R syntax to find the standard deviation of “birthweight”.  
Use a single R syntax to create a histogram of “birthweight”.

# Question #2

This question is about arsenic in rice with a unit of ug/serving.  
Ar\_rice <- c(6.1, 5.4, 6.9, 4.9, 6.6, 6.3, 6.7, 8.2, 7.8, 1.5, 5.4, 7.3)  
Construct a histogram with 2 units of bin size.  
Give the title “Measured amount of arsenic in brown rice”.  
Give a y label “Amount (ug/serving)”.

# Question #3

The two vectors “father” and “son” lists heights (in.).

Use a descriptive statistical method to describe the two variables.

father <- c(73.0, 75.5, 75.0, 75.0, 75.0, 74.0, 74.0, 73.0, 73.0, 78.5)  
son <- c(74.0, 73.5, 71.0, 70.5, 72.0, 76.5, 74.0, 71.0, 72.0, 73.2)  
Write the command of a scatter plot.

# Question #4

Using the ggplot2 package, create a scatter plot of the iris dataset (included in ggplot2), where the x-axis represents the sepal width and the y-axis represents the sepal length. Color the points by the class of the species. The title is “Sepal width vs. sepal length”.

# Question #5

Assume that a randomly selected subject is given a bone density test. The test scores are normally distributed with a mean of 0 and a standard deviation of 1. Find the bone density test score corresponding to the given information.

1. Find the bone density score separating the bottom 99% from the top 1% (Z0.01).

2. If the bone density in the bottom 2% and the top 2% are used as cutoff points for levels that are too low or too high, find the two cutoff values.

# Question #6

Assume that a randomly selected subject is given a bone density test. The test scores are normally distributed with a mean of 0 and a standard deviation of 1.  
1. Find the probability of the given bone density test score between -2.75 and 2.75.

2. Find the probability of a given bone density test score between -2.0 and 2.0

# Question #7

Finding the probability of something being an outlier from a normal distribution.

# Question #8

Find the indicated critical values. Round results to two decimal places.

Z 0.10, Z 0.97, and Z 0.025

# Question #9

Pulse Rates of Females: Refer to Data “Body Data” and use the pulse rates (beats per minute) of females (0=F, 1=M), to construct a histogram of females’ pulse rates.

Do the pulse rates of females appear to have a normal distribution?

# Question #10

Below are the measured radiation emissions (W/kg) corresponding to these randomly selected cell phones: S1, B1, B2, M1, T1, A1, P1, P2, N1, A2, K1. The data are from the Environment Working Group. The media often reports about the dangers of cell phone radiation as a cause of disease.

Construct a 90% confidence interval estimate of the population mean. What does the result suggest about the Federal Communications Commission (FCC) standard that cell phone radiation must be less than 1.6 W/kg?

0.38; 0.55; 1.54; 1.55; 0.50; 0.6; 0.92; 0.96;1.00; 0.86; 1.46

# Question #11

Bipolar depression treatment. In an experiment designed to test the effectiveness of paroxetine for treating bipolar depression, subjects were measured using the Hamilton depression scale, with the results given:

placebo group, n=43, mean=21.57, s=3.87;

Paroxetine treatment group: n=33, mean=20.38, s=3.91.

Use a 0.05 significance level to test the claim that the treatment and placebo groups come from populations with the same mean.

What does the result of the hypothesis test suggest about paroxetine as a treatment for bipolar depression?

# Question #12

Diastolic blood pressure for women. Use the diastolic blood pressure measurements for adult females in dataset “Body Data” to test the claim that the adult female population has a mean diastolic blood pressure less than 90 mmHg.

A diastolic blood pressure above 90 is considered to be hypertension. Use a 0.05 significance level, based on the result, can we conclude that none of the adult females in the sample have hypertension?

# Quesiton #13

LCData set. Research question: Does lung capacity (in liters) differ between smokers and nonsmokers?

a. Use boxplot to examine the relationship between a numeric outcome variable (Y) and a categorical variable (x).

b. Write Ho and Ha hypotheses, and assumption check.

c. decides a left-sided, right-sided, or two-sided test, and decide a significant level (or type I error.

d. assumes equal variances, use t.test command to find a p value.

e. interpret the R output and identify the test.statistic, df, p value, 95% CI, and means. f. interprets the CI, and use CI to conclude (reject Ho or FTR Ho?).

g. manually calculates the mean difference’s 95% CI.

h. manually calculates the t.statistic and p value.