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IST 772

Dr. Block

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**Homework 10**

**Beginning Statement**

“I produced the material below with no assistance [direct quote from IST 772 class syllabus].” Note: Homework questions from the book may have been copied/pasted into the document for both the student and viewer’s convenience.

As per instructions, a website was referenced to find historical quotes for one of the below problems.

The homework for week 10 is exercises 2, 5, 6, 7, and 8 on pages 272 and 273.

**Homework Question 2**

**Question:**

2. Download and library the nlme package and use data ("Blackmore") to activate the

Blackmore data set. Inspect the data and create a box plot showing the exercise level at

different ages. Run a repeated measures ANOVA to compare exercise levels at ages 8, 10,

and 12 using aov(). You can use a command like, myData <-Blackmore[Blackmore$age

<=12,], to subset the data. Keeping in mind that the data will need to be bal-

anced before you can conduct this analysis, try running a command like this,

table(myData$subject,myData$age)), as the starting point for cleaning up the data set.

**Answer/Student Response:**

The following was generated and observed:

Graphical user interface, text, application

Description automatically generated

Graphical user interface, text

Description automatically generated

The p-value is statistically significant showing a value under the threshold of 0.05 (i.e., 1.33e-11). This signifies that there is a significant difference in terms of the age attributes and exercise performed. Based on this, we can reject the null hypothesis that the difference between the attributes is zero (or essentially zero).

**Homework Question 5**

**Question:**

5. Given that the AirPassengers data set has a substantial growth trend, use diff() to cre-

ate a differenced data set. Use plot() to examine and interpret the results of differenc-

ing. Use cpt.var() to find the change point in the variability of the differenced time series.

Plot the result and describe in your own words what the change point signifies.

**Answer/Student Response:**

**Homework Question 6**

**Question:**

6. Use cpt.mean() on the AirPassengers time series. Plot and interpret the results. Com-

pare the change point of the mean that you uncovered in this case to the change point

in the variance that you uncovered in Exercise 5. What do these change points suggest

about the history of air travel?

**Answer/Student Response:**

**Homework Question 7**

**Question:**

7. Find historical information about air travel on the Internet and/or in reference materials

that sheds light on the results from Exercises 5 and 6. Write a mini-article (less than 250

words) that interprets your statistical findings from Exercises 5 and 6 in the context of

the historical information you found.

**Answer/Student Response:**

**Homework Question 8**

**Question:**

8. Use bcp() on the AirPassengers time series. Plot and interpret the results. Make sure to

contrast these results with those from Exercise 6.

**Answer/Student Response:**