RWTH BUSINESS SCHOOL

Mathematics & Statistics
M.Sc. Data Analytics and Decision Science

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BUSINESS SCHOOL | RWTH AACHEN UNIVERSITY

Problem 1 - Physician Office Waiting Times.

The average waiting time for a patient at an El Paso physician's office is just over 29 minutes, well above the national average of 21 minutes. In order to address the issue of long patient wait times, some physician's offices are using wait tracking systems to notify patients of expected wait times. Patients can adjust their arrival times based on this information and spend less time in waiting rooms. The following data show wait times (minutes) for a sample of patients at offices that do not have an office tracking system and wait times for a sample of patients at offices with an office tracking system.

a. What are the mean and median patient wait times for offices with a wait tracking system? What are the mean and median patient wait times for offices without a wait tracking system?

b. What are the variance and standard deviation of patient wait times for offices with a wait tracking system? What are the variance and standard deviation of patient wait times for visits to offices without a wait tracking system?

c. Do offices with a wait tracking system have shorter patient wait times than offices without a wait tracking system? Explain.

d. Considering only offices without a wait tracking system, what is the z-score for the tenth patient in the sample?

e. Considering only offices with a wait tracking system, what is the z-score for the sixth patient in the sample? How does this z-score compare with the z-score you calculated for part (d)?

f. Based on z-scores, do the data for offices without a wait tracking system contain any outliers? Based on z-scores, do the data for offices with a wait tracking system contain any outliers?

Without Wait Tracking System	With Wait Tracking System
24	31
67	11
17	14
20	18
31	12
44	37
12	9
23	13
16	12
37	15

Problem 2 – Smoke Detectors

Over the past 40 years, the percentage of homes in the United States with smoke detectors has risen steadily and has plateaued at about 96% as of 2015 (National Fire Protection Association website). With this increase in the use of home smoke detectors, what has happened to the death rate from home fires? The file SmokeDetectors contains 17 years of data on the estimated percentage of homes with smoke detectors and the estimated home fire deaths per million of population.

a. Do you expect a positive or negative relationship between smoke detector use and deaths from home fires? Why or why not?

b. Compute and report the correlation coefficient. Is there a positive or negative correlation between smoke detector use and deaths from home fires? Comment.

c. Show a scatter plot of the death rate per million of population and the percentage of homes with smoke detectors.

Problem 3 – The Stock Market

The Russell 1000 is a stock market index consisting of the largest U.S. companies. The Dow Jones Industrial Average is based on 30 large companies. The file Russell gives the annual percentage returns for each of these stock indexes for the years 1988 to 2012.

a. Plot these percentage returns using a scatter plot.

b. Compute the sample mean and standard deviation for each index.

c. Compute the sample correlation.

d. Discuss similarities and differences in these two indexes.

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