

Homework Assignment-8

POM 500 Statistical Analysis

Note: Attempt all questions as per rubric. Problems including case study has a weightage of 10 marks each. The maximum you can score is 50. Use Excel function wherever possible.

Problem-1

Widget, Inc. manufactures a certain type of metallic bar with a tensile strength of 88 kilograms with a standard deviation of 3.5 kilograms. Several of its customers have complained about excessive variability of tensile strength of recently purchased bars

As part of an investigation to check the validity of these complaints, a Black Belt has performed destructive testing on 23 samples from a recent production batch and obtained a standard deviation of 3.8 kilograms.

- a) Calculate a 95% confidence interval for the standard deviation of tensile strength.
- b) Are the concerns from the customers valid?

Problem-2

To analyze the risk, or volatility, associated with investing in General Electric common stock, a sample of eight quarterly percent total returns was identified as shown below. The percent total return includes the stock price change plus the dividend payment for the quarter.

20	-20.5	12.2	12.6	10.5	-5.8	-18.7	15.3
----	-------	------	------	------	------	-------	------

- a) What is the value of sample mean? What is its interpretation?
- b) Compute the sample variance and sample standard deviation as measures of volatility for the quarterly return for General Electric.
- c) Construct a 95% confidence interval for the population variance.
- d) Construct a 95% confidence interval for the population standard deviation.

Problem-3

The personnel department of a large corporation reported sixty resignations during the last year. The following table groups these resignations according to the season in which they occurred:

Season	Number of Resignations
Winter	10
Spring	22
Summer	19
Fall	09

Test (Goodness of Fit) to see if the number of resignations is uniform over the four seasons. Use 95% confidence level.

Problem-4

Five hundred randomly selected automobile owners were questioned on the main reason they had purchased their current automobile. The results are given below.

Gender	Styling	Engineering	Fuel Economy	Total
Male	70	130	150	350
Female	30	20	100	150
Total	100	150	250	500

Give your conclusion for this test with 90% confidence level.

Case Study: Fuentes Salty Snacks, Inc

Six months ago, Fuentes Salty Snacks, Inc. added a new flavor to its line of potato chips. The new flavor, candied bacon, was introduced through a nationwide rollout supported by an extensive promotional campaign. Fuentes' management is convinced that quick penetration into grocery stores is a key to the successful introduction of a new salty snack product, and management now wants to determine whether availability of Fuentes' Candied Bacon Potato Chips is consistent in grocery stores across regions of the U.S. Fuentes Marketing department has selected random samples of 40 grocery stores in each of its eight U.S. sales regions:

- New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)
- Mid-Atlantic (New Jersey, New York, and Pennsylvania)
- Midwest (Illinois, Indiana, Michigan, Ohio, and Wisconsin)
- Great Plains (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, and South Dakota)
- South Atlantic (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, Washington DC, and West Virginia)
- Deep South (Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Tennessee, and Texas)
- Mountain (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming)
- Pacific (Alaska, California, Hawaii, Oregon, and Washington)

The stores in each sample were then contacted, and the manager of each store was asked whether the store currently carries Fuentes' Candied Bacon Potato Chips. The complete data set is available in the file *FuentesChips*.

Fuentes' senior management now wants to use these data to assess whether penetration of Fuentes' Candied Bacon Potato Chips in grocery stores is consistent across its eight U.S. sales regions. If penetration of Fuentes' Candied Bacon Potato Chips in grocery stores differs across its eight U.S. sales regions, Fuentes' management would also like to identify sales regions in which penetration of Fuentes' Candied Bacon Potato Chips is lower or higher than expected.

Managerial Report

Prepare a managerial report that addresses the following issues.

1. Use descriptive statistics to summarize the data from Fuentes' study. Based on your descriptive statistics, what are your preliminary conclusions about penetration of Fuentes' Candied Bacon Potato Chips in grocery stores across its eight U.S. sales regions?
2. Use the data from Fuentes' study to test the hypothesis that the proportion of grocery stores that currently carries Fuentes' Candied Bacon Potato Chips is equal across its eight U.S. sales regions. Use $\alpha = .05$.