

Midterm Preparation Problems

CASE # 1 – HOX PLOT CASE from Lesson 2

CASE #2- Products are returned to stores for a variety reasons. A recent study showed that 60% are for operational reasons, 30% for cosmetic reasons, and the remaining for other reasons. The probability that an item returned for operational reasons will be under warranty is 0.7, while the probabilities that an item is returned for cosmetic or other reasons will be under warranty are 0.5 and 0.6, respectively.

- a. If an item is returned, what is the probability that it is
 - i. with warranty
 - ii. without warranty?
- b. If an item with a warranty is returned, what is the probability that it is for cosmetic reason?
- c. If at any time 50 items are returned to a store, how many are expected to be without warranties?

CASE # 3- In a factory with a very large number of machines some machines break down almost daily. The factory management has determined daily machine breakdowns are independent. The number of machine breakdowns per day and their respective probabilities as shown below:

Number of Breakdowns - x	0	1	2	3	4	Total
Probability - $P(x)$	0.12	0.36	0.35	0.11	0.06	1

- a. Find the mean and the standard deviation of the number of machine breakdowns per day.
- b. If two days are selected randomly, what is the probability that there will be three breakdowns each day?
- c. What is the probability that the number of breakdowns per day is more than the expected number of breakdowns per day?

CASE # 4-The coming year is expected to be a good one for your company with probability 0.65. Given that it is a good year, you expect that a dividend will be declared with probability 0.80. However, if it is not a good year, then a dividend will occur with probability 0.15.

- a. What is the probability that it is a good year and a dividend is issued?
- b. What is the probability that a dividend is issued?
- c. If dividend is issued, what is the probability that it is a good year?

CASE # 5- About 40% of all customers of ZUBRAK Charge Card pay their bills in full before any interest charges are incurred.

- a. In a random sample of 10 card holders, estimate the number of customers who are expected to pay their account balances after interest charges are incurred? What is the standard deviation?
- b. In a random sample of 10 card holders, estimate the probability that at least half of the expected number of customers pay their account balances before interest charges are incurred?

CASE # 6-Air travel time between two cities is normally distributed with a mean of 2 hours and standard deviation of 10 minutes.

- a. Find the percentage of all flights that take at least 125 minutes.
- b. Find the percentage of all flights that take between 100 and 130 minutes.
- c. If a scheduled flight time is 2 hours and 7 minutes, what percentage of flights are more than 5 minutes late?
- d. How long is a flight if it takes longer than 80% of all other flights between two cities?

Midterm Exam C215 Learning Objectives

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Chapter 1- Data and Statistics

1. Obtain an appreciation for the breadth of statistical applications in business and economics.
2. Understand the meaning of the terms elements, variables, and observations as they are used in statistics.
3. Obtain an understanding of the difference between categorical, quantitative data.
4. Learn about the sources of data for statistical analysis both internal and external to the firm.
5. Be aware of how errors can arise in data.
6. Know the meaning of descriptive statistics and statistical inference.
7. Be able to distinguish between a population and a sample.
8. Understand the role a sample plays in making statistical inferences about the population.
9. Be aware of ethical guidelines for statistical practice.

Chapter 2-Descriptive Statistics: Tabular and Graphical Presentations

1. Learn how to construct and interpret summarization procedures for qualitative data such as: frequency and relative frequency distributions, bar graphs and pie charts.
2. Learn how to construct and interpret tabular summarization procedures for quantitative data such as:
frequency and relative frequency distributions, cumulative frequency and cumulative relative frequency distributions.
3. Learn how to construct a dot plot, a histogram, and an ogive as graphical summaries of quantitative data.
4. Learn how the shape of a data distribution is revealed by a histogram. Learn how to recognize when a data distribution is negatively skewed, symmetric, and positively skewed.
5. Be able to use and interpret the exploratory data analysis technique of a stem-and-leaf display.

Chapter 3- Descriptive Statistics: Numerical Measures

1. Understand the purpose of measures of location.
2. Be able to compute the mean, median, mode, quartiles, and various percentiles.
3. Understand the purpose of measures of variability.
4. Be able to compute the range, interquartile range, variance, standard deviation, and coefficient of variation.
5. Understand skewness as a measure of the shape of a data distribution. Learn how to recognize when a data distribution is negatively skewed, roughly symmetric, and positively skewed.
6. Understand how z scores are computed and how they are used as a measure of relative location of a data value.
7. Know how Chebyshev's theorem and the empirical rule can be used to determine the percentage of the data within a specified number of standard deviations from the mean.
8. Learn how to construct a 5-number summary and a box plot.
9. Be able to compute and interpret covariance and correlation as measures of association between two variables.

Chapter 4- Introduction to Probability

1. Understand probability as a numerical measure of the likelihood of occurrence.
2. Know the three methods commonly used for assigning probabilities and understand when they should be used.
3. Know how to use the laws that are available for computing the probabilities of events.

Chapter 5- Discrete Probability Distributions

1. Understand the concepts of a random variable and a probability distribution.
2. Be able to distinguish between discrete and continuous random variables.
3. Be able to compute and interpret the expected value, variance, and standard deviation for a discrete random variable.
4. Be able to compute and work with probabilities involving a binomial probability distribution.

Chapter 6- Continuous Probability Distributions

1. Understand the difference between how probabilities are computed for discrete and continuous random variables
2. Be able to compute probabilities using a normal probability distribution. Understand the role of the standard normal distribution in this process.