



DAT 310: Module Five Exercise Guidelines and Rubric

Overview

In this exercise, you will apply your understanding of concepts learned in this module to different problems. The exercise is divided into three parts.

Prompt

Part 1: Uncertainty Calculations

Answer the questions below (from *Data-Driven Business Decisions*, p. 92). In your submission, include the numerical solutions, a detailed step-by-step breakdown of any calculations, and a description of the significance of the results.

You are trying to classify drivers in terms of accident risk. You define the top 25% of drivers to be Good, the bottom 25% to be Bad, and the rest as Medium. From historical data you believe that Good drivers have a 95% chance of no accident in any given year, Medium drivers have a 90% chance, and Bad drivers have a 75% chance. You also believe that the chance of having multiple accidents in a given year is 3% for Good drivers, 5% for Medium drivers, and 15% for Bad drivers.

- a. What is the probability that a driver has exactly one accident in a year (1) given that he is a Good driver, (2) given that he is a Medium driver, and (3) given that he is a Bad driver?
- b. A prospective customer has a record of having had zero accidents last year. What is your assessment? Is he a Good, Bad, or Medium driver? Write an explanation that includes all calculations performed to arrive at an answer.
- c. A prospective customer has a record of having had one accident last year. Would you classify him as a Good, Bad, or Medium driver? How sure are you? Write an explanation that includes all calculations performed to arrive at the answer.

Part 2: Using Uncertainty Calculations to Develop a Plan

The following data provides some monetary figures that would likely be considered when an insurance company uses uncertainty data to make business decisions.

Costs of Crashes

According to the Insurance Research Council's (IRC) Auto Injury Insurance Claims Study:

- In 2012, the average auto liability claim for property damage was \$3,073; the average auto liability claim for bodily injury was \$14,653. (These are claims paid to individuals considered "Not at Fault.")
- In 2012, the average collision claim was \$2,950; the average comprehensive claim was \$1,585. (These are claims paid to the "At Fault" individuals covered by the insurance policy.)

Who Pays

Private insurers pay approximately 50% of all motor vehicle crash costs. Individual crash victims pay about 26%, while third parties such as uninvolved motorists delayed in traffic, charities, and health care providers pay about 14%. Federal revenues account for 6%, while state and local municipalities pick up about 3%. Overall, those not directly involved in crashes pay for nearly three-quarters of all crash costs, primarily through insurance premiums, taxes, and travel delay.

Using this data and the calculations from Part 1, analyze the scenario and develop a plan for dealing with this uncertainty and chance.

- What information do you need to determine a reasonable insurance premium rate for a "Medium" driver?
- In determining final costs for insurance companies, what are the variables of uncertainty that cannot be controlled but still need to be considered?
- Create a plan to deal with the uncertainty in the decision of calculating a reasonable auto premium. This plan should include the data figures for Good, Medium, and Bad drivers calculated in Part 1, as well as the costs associated with the average costs of auto accidents.

Part 3: Probability Problems

Follow the instructions for each problem listed below (from p. 137 of *Data-Driven Business Decisions*). You will be assessed on the **correctness and completeness** of your responses.

- E2
A market survey is given to 1000 people. One of the questions concerns whether the person recognizes the brand name X. It is known that roughly 60% of people respond “yes” though this varies to some extent over time, and one of the purposes of the survey is to monitor this.
 - a) How many of the 1000 people would you expect to recognize brand X? Your answer should not be a single number!
 - b) Based on your answer to (a), how uncertain and unreliable is the proportion of people who recognize brand X?
 - c) If a particular survey gave the result of 62% recognition and then a month later the proportion had dropped to 57%, would you be convinced that brand recognition is really decreasing?
- E3
You survey 500 customers on whether or not they recognize your brand. On the basis of historical norms you expect 35% or 175 to recognize your brand. But you have been spending more money than usual on advertising. How many more than 175 would start to convince you that the extra money had been worth the expense?



Guidelines for Submission

Submit your responses in a Word file. Use double spacing, 12-point Times New Roman font, and one-inch margins.

Critical Elements	Exemplary (100%)	Proficient (85%)	Needs Improvement (55%)	Not Evident (0%)	Value
Part 1: Accuracy of Probability Calculations	Meets “Proficient” criteria and completes an accurate breakdown of steps to explain thinking	Calculations of probability problems in Part 1 are accurate	Calculations of probability problems in Part 1 are inaccurate	No calculations for probability problems are included	25
Part 1: Written Explanations	Meets “Proficient” criteria and includes supporting information or calculations	All explanations of results are clearly written and include complete thoughts	Explanations of results are not clearly written and/or include incomplete thoughts	There are no written explanations	25
Part 2: Planning	Meets “Proficient” criteria and includes separate recommendations and consideration for a variety of options	Planning on how to solve the problems is thorough and includes relevant information from Parts 1 and 2	A plan is presented but does not integrate information from both Parts 1 and 2 or does not address different categories of driver	No planning is presented	25
Part 3: Correctness and Completeness	Meets “Proficient” criteria, and submission is clearly presented in a professional manner	Submission correctly addresses nearly all parts of the questions	Submission includes partial answers for the questions	The assignment is not completed	25
Earned Total					100%