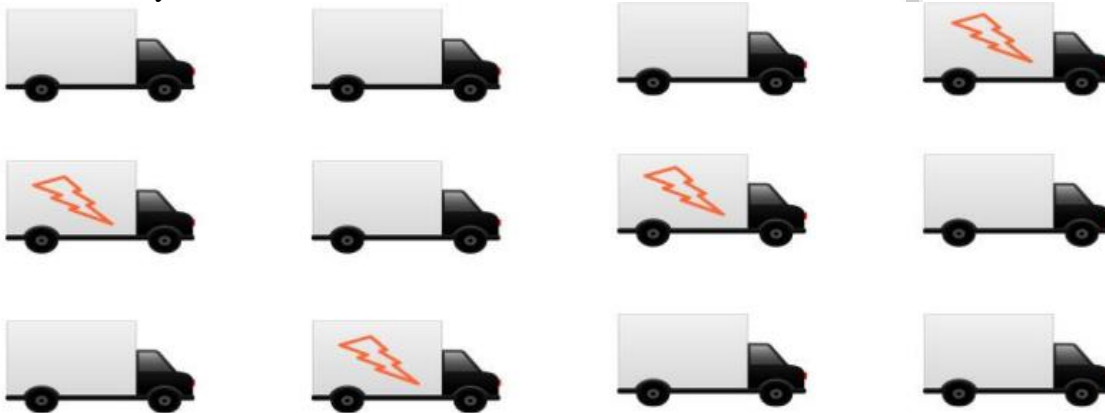


Practical Data Science (Probability)

Write R Scripts or use R to perform any mathematical operations while solving the following problems.

Problem 1: Faulty brakes in Delivery trucks

A delivery company has 12 trucks, of which 4 have faulty brakes. If an inspector randomly chooses two of the trucks for brake check, what is the probability that neither one has faulty brakes?



Problem 2: Conditional Probability

A total of 500 married working couples were polled about their annual salaries, with the following information resulting. 212 couples reported both the husband and wife earned less than \$25,000, 198 couples reported only the husband earned more than \$25,000, 36 couples reported that only the wife earned more than \$25,000, and 54 couples reported that both the husband and wife earned more than \$25,000. If one of the couples is randomly chosen, what is

- the probability that the husband earns less than \$25,000?
- the conditional probability that the wife earns more than \$25,000 given that the husband earns more than this amount?
- the conditional probability that the wife earns more than \$25,000 given that the husband earns less than this amount?

Problem 3: Chain Rule

A recent college graduate is planning to take the first three data science examinations in the coming summer. She will take the first actuarial exam in June. If she passes that exam, then she will take the second exam in July, and if she also passes that one, then she will take the third exam in September. If she fails an exam, then she is not allowed to take any others. The probability that she passes the first exam is 0.9. If she passes the first

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exam, then the conditional probability that she passes the second one is 0.8, and if she passes both the first and the second exams, then the conditional probability that she passes the third exam is 0.7. What is the probability that she passes all three exams?

Problem 4: Bayes Rule

- Two dice are tossed, one green and one red. What is the conditional probability that the number on the green die is 6, given that the sum on the two dice is 7?
- Suppose that 5% of men and 0.25% of women are color-blind. A color-blind person is chosen at random. What is the probability of this person being male? Assume that there are an equal number of males and females.

Problem 5: Rain forecast for Marie's Marriage

Marie is getting married tomorrow at an outdoor ceremony in the desert and the weatherman is trying to predict whether it will rain tomorrow or not. In recent years, it has rained only 5 days each year ($5/365 = 0.014$). When it actually rains, the weatherman correctly forecasts rain 90% of the time. When it doesn't rain, he incorrectly forecasts rain 10% of the time.

- What is the probability that it will rain on Marie's wedding?
- What is the best hypothesis weatherman can conclude?