1. The question, "Do you smoke?" was asked of 100 people. Results are shown in the table.

|  |  |  |  |
| --- | --- | --- | --- |
| . | **Yes** | **No** | **Total** |
| **Male** | 19 | 41 | **60** |
| **Female** | 12 | 28 | **40** |
| **Total** | **31** | **69** | **100** |

(i) What is the probability of a randomly selected individual being a male who smokes?

(ii) What is the probability of a randomly selected individual being a male?

(iii) What is the probability of a randomly selected individual smoking?

(iv) What is the probability of a randomly selected male smoking?

(v) What is the probability that a randomly selected smoker is male?

<https://people.richland.edu/james/lecture/m170/ch05-cnd.html>

2. There are three major manufacturing companies that make a product: Aberations, Brochmailians, and Chompielians. Aberations has a 50% market share, and Brochmailians has a 30% market share. 5% of Aberations' product is defective, 7% of Brochmailians' product is defective, and 10% of Chompieliens' product is defective.

(i) What is the probability a randomly selected product is defective?

(ii) What is the probability that a defective product came from Brochmailians?

(iii)Are these events independent?

Practice: Table or Venn diagram:

3. Players are strongly advised to warm up before playing sports games to reduce their risk of injury from playing the game.

 For a particular sports team of 20 players:

 • 14 of the players warmed up before the last game

 • 5 of the players were injured during the last game

 • 2 of the players did not warm up and were not injured during the last game.

 Using this information, calculate the probability that a randomly chosen player from the team was injured, given that the player did not warm up before the last game.

Practice: Table or Probability Tree

# 4. On a certain type of aircraft the warning lights (showing green for normal and red for trouble) for the engines are accurate 90% of the time. If there are problems with the engines on 2% of all flights, find the probability that there is a fault with an engine, given that the warning light shows red.

5. One of the biggest problems with conducting a mail survey is the poor response rate. In an effort to reduce nonresponse, several different techniques for formatting questionnaires have been proposed. An experiment was conducted to study the effect of the questionnaire layout and page size on response in a mail survey. The results are given below.

|  |  |  |  |
| --- | --- | --- | --- |
| Format | Responses | Nonresponses | Total |
| Typewritten (small page)Typewritten (large page)Typeset (small page)Typeset (large page) | 8619172192 | 57976992 | 143288141284 |
| Total | 541 | 315 | 856 |

a. What proportion of the sample responded to the questionnaire?

b. What proportion of the sample received the typeset small-page version?

c. What proportion of those who received a typeset large-page version actually responded to the questionnaire?

d. What proportion of the sample received a typeset large-page questionnaire and responded?

e. What proportion of those who responded to the questionnaire actually received a type-written large page questionnaire?

f. By looking at the response rates for each of the four formats, what do you conclude from the study?

# 6. A cab was involved in a hit-and-run accident at night. There are two cab companies that operate in the city, a Blue Cab company and a Green Cab company. It is known that 85% of the cabs in the city are Green and 15% are Blue. A witness at the scene identified the cab involved in the accident as a Blue Cab. The witness was tested under similar visibility conditions, and made correct colour identifications in 80% of the trial instances. What is the probability that the cab involved in the accident was a Blue cab rather than a Green one?

7(a). A survey of newspaper purchasing patterns in a particular region found that 3⁄5 of the households surveyed purchased a daily newspaper during the previous week. The survey also found that in 7⁄10 of the households where a daily newspaper was purchased during the previous week, a Sunday paper was also purchased. A Sunday paper was purchased in 1⁄4 of households where no daily newspaper was purchased.

What is the probability that, in a household chosen at random from those surveyed:

(i) a daily newspaper was purchased **or** a Sunday newspaper was purchased (**but not both**)?

(ii) a daily newspaper was purchased, given that a Sunday newspaper was purchased?

7(b)

In a different survey of 120 households, where 70 of them purchased a daily newspaper, the following information was obtained.

|  |  |  |
| --- | --- | --- |
| **Nature of household** | **Number of households** | **Number of households purchasing a daily newspaper** |
| Contains at least one primary school student | 44 | 27 |
| Contains at least one secondary school student | 39 | 21 |
| Contains no school age children | 63 | 36 |

Households may contain both primary and secondary students.

(i) Find the probability that a household chosen at random from this sample contains both primary and secondary school students.

 A household is randomly selected.

(ii) Demonstrate mathematically that the event “the household contains both primary and secondary school students” and the event “the household purchases a daily newspaper” are not independent.

(iii) Find the probability that a household contains at least one secondary school student, given that the household purchases at least one daily newspaper.