

First Midterm Exam

Stat 216

Exercise 1

The probability that a visit to a primary care physician's (PCP) office results in neither lab work nor referral to a specialist is 35%. Of those coming to a PCP's office, 30% are referred to specialists and 40% require lab work.

Calculate the probability that a visit to a PCP's office results in both lab work and referral to a specialist.

Exercise 2

A doctor in public hospital studied a group of persons for five years. In the beginning, 20% were classified as high blood pressure, 30% as low blood pressure, and 50% as normal blood pressure. Results of the study showed that the probability of dying of a person given that he has low blood pressure was twice as likely as the probability of dying given that he has normal blood pressure during the five-year study, but only half as likely as the probability of dying given that he has high blood pressure.

Calculate the probability that a person has a high blood pressure given that he died during the five-year period.

Exercise 3

An auto insurance company insures customers in three separate categories : $\mathcal{A}$, $\mathcal{B}$, and $\mathcal{C}$. Of the company's customers, 50% are $\mathcal{A}$, 40% are $\mathcal{B}$, and 10% are $\mathcal{C}$. The probability that a customer will have an accident in the next year given that he belongs to the category $\mathcal{A}$ is 0.01, the probability that a customer will have an accident in the next year given that he belongs to the category $\mathcal{B}$ is 0.005, and the probability that a customer will have an accident in the next year given that he belongs to the category $\mathcal{C}$ is 0.001.

Calculate the probability that a customer belonged to the category $\mathcal{C}$ given that he will have an accident in the next year.

Exercise 4

A life insurance company insures customers for their lives. An actuary compiled the following statistics of customers with different ages :

Age	Probability of dying	Portion of Company's Insured customer $\mathbb{P}(A_i)$
$A_1 : 16-20$	0.06	0.08
$A_2 : 21-30$	0.03	0.15
$A_3 : 31-65$	0.02	0.49
$A_4 : 66-99$	0.04	0.28

Calculate the probability that an insured customer was aged 16-20 given that he has died.

Exercise 5

A health study tracked a group of persons and indicated that the probability that a randomly chosen person has heartbeat problem is 0.25. The probability that a persons is smoker given that he have heartbeat problem is twice as likely as the probability that he is smoker given that he have no heartbeat problem.

Calculate the probability that a person has a heartbeat problem, given that he is a smoker.