

Homework 02

STAT 509 Statistics for Engineers

Summer 2017 Section 001

Instructor: Tahmidul Islam

Question 01

A and B are two events in the sample space S. Assume $P(A) = 0.25$ and $P(B) = 0.4$ and $P(A \cup B) = 0.6$. Calculate the following probabilities. Clearly state what probability rules you used. (Hint: You can draw Venn Diagrams to help you visualize the relationship among two events and the sample space.)

- $P(\bar{A})$.
- $P(A \cap B)$.
- $P(\bar{A} \cup \bar{B})$.
- $P(B|A)$.
- Are A and B independent events? Why or why not?

Question 02

Transactions to a computer database are either new items or changes to previous items. The addition of an item can be completed in less than 100 milliseconds 90% of the time, but only 20% of changes to a previous item can be completed in less than this time. If 30% of transactions are changes, what is the probability that a transaction can be completed in less than 100 milliseconds? (Try to draw a tree diagram).

Question 03

The probability that a randomly chosen automobile will need an oil change is 0.25; the probability that it needs a new oil filter is 0.40; and the probability that both the oil and filter need changing is 0.14.

- What is the probability that a car will need an oil change or new filter?
- If the oil had to be changed, what is the probability that a new oil filter is needed?
- If a new oil filter is needed, what is the probability that the oil has to be changed?
- Are oil filter and needing an oil change independent of one another. Why?