EECS 861

Homework #2

1. (Concepts: sample space, events, equally likely definition of probability)

An experiment consists of observing three consecutive packets entering a port on a Internet router. Based on the packet header, each packet can be classified as either video (v) or as ordinary data (d). Your observation is a sequence of three letters (each letter is either v or d). For example, the result of one experiment could be two video packets followed by one data packet denoted as vvd.

a. What is the sample space for this experiment?

b. What assumptions are you going to use?

Define events as:

A 1 = {second packet is video},

A2 = {all packets are the same},

A3 = {one or more video packets},

B1 = {second packet is data},

B2 = {video and data alternate},

B3 = {two or more data packets}.

c. Are the pair A1 and B1 are mutually exclusive and collectively exhaustive?

d. Are the pair A3 and B3 mutually exclusive?

e. What is P(A1 ∩ B1)?

f. What is P(A1)?

g. What is P(B1)?

h. What is P(A3)?

i. What is P(B3)?

j. What is P(A3 ∩ B3)?

2. (Concepts: determine probabilities from a file, probability in a range)

For this problem use the data in the file

http://www.ittc.ku.edu/~frost/EECS_861/EECS_861_HW_Fall_2024/Hw2Problem2.csv

a. Given this data what is P(value>0)?

b. Given this data what is P(value<0.1)?

c. Given this data what is P(-0.5<value<0.5)?

d. Given this data plot $P(\text{value} < x_i)$ for

x_i= -4.0, -1.0, -0.5, -0.25, 0.0, 0.25, 0.5, 1.0, 4.0

e. Given this data what is P(value=0.10000)?

f. State the definition of probability and associated assumptions you used in this problem.

3. (Concepts: Joint, marginal, conditional probabilities, statistical independence)

Given a table of joint probabilities of A_j j=1,2,3 and B_i, i=1,2,3

□	B_1	B_2	B_3
A_1	.2	*	0.05
A_2	*	.1	0.05
A_3	.3	0.05	*
$P(B_j)$	.6	0.2	0.2

a. Find the missing probabilities (*) in the table.

b. Find $P(A_2 | B_2)$

c. Find $P(B_2 | A_1)$

d. Are A_i and B_j statistical independent?

4. (Concept: do the homework)

The probability that you pass this class given you do all the homework is 0.975. The probability that you pass this class given you do not do all the homework is 0.05. The probability that you do all the homework is 0.90. Given you pass this course what is the probability you did all the homework.