Question 1

Consider a standard 52-card deck of cards with 13 card values (Ace, King, Queen, Jack, and 2-10) in each of the four suits (clubs, diamonds, hearts, spades).

Answer each of the below. Note that "or" in this question refers to inclusive, not exclusive, or.

a) If a card is drawn at random, what is the probability that it is a heart?
b) If a card is drawn at random, what is the probability that it is a spade or a two?
c) If one card is drawn at random, and then a second card is drawn at random from the same deck (without replacing the first card), what is the probability that both cards are eights?
d) If one card is drawn at random, and then a second card is drawn at random from the same deck (without replacing the first card), what is the probability that both cards have the same value?

Answers

a) TODO
b) TODO
c) TODO
d) TODO

Question 2

Imagine flipping two fair coins, where each coin has a Heads side and a Tails side, with Heads coming up 50% of the time and Tails coming up 50% of the time. The possible outcomes are:

- 2 heads
- 1 head, 1 tail
- 2 tails

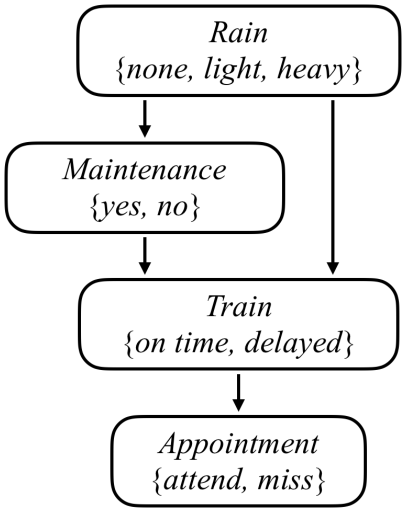
Give the probability distribution over these three events.

Answer

TODO

Question 3

Consider the Bayesian Network shown in lecture, reproduced below.



a) Does whether the train is on time or not change the probability that the appointment is attended? Why or why not?
b) Assume you know there is heavy rain. Does whether there is track maintenance or not change the probability that the train is on time? Why or why not?
c) Assume you know there is heavy rain. Does whether there is track maintenance or not affect the probability that the appointment is attended? Why or why not?
d) Assume you know the train is on time. Does whether there is heavy rain or not affect the probability that the appointment is attended? Why or why not?

Answers

a) TODO
b) TODO
c) TODO
d) TODO

Question 4

Two factories — Factory A and Factory B — design batteries to be used in mobile phones. Factory A produces 60% of all batteries, and Factory B produces the other 40%. 2% of Factory A's batteries have defects, and 4% of Factory B's batteries have defects.

Assuming the above information, answer each of the below (you may round answers to three decimal places).

a) What is the probability that a battery is both made by Factory A and defective?
b) Given no additional information, what is the probability that a battery is defective?
c) If a battery is defective, what is the probability that it was made by Factory A?

Answers

a) TODO
b) TODO
c) TODO