

## Dr. Z.'s Intro to Probability Homework assignment 4

1. A coin is flipped three times. Assuming that all the eight outcomes

$$\{hhh, hht, hth, htt, thh, tht, tth, ttt\} \quad ,$$

are equally likely, what is the conditional probability that all flips landed on head, given that

- (i) the first two flips were heads
- (ii) the first and last flip were heads
- (iii) at least one flip was a head
- (iv) at least two flips were heads
- (v) all three flips were heads

2. Pedro wants to work at Google. He finds out that out of the people who apply, the probability of getting a phone interview is 0.1. Once you get a phone interview, the probability of getting a site interview is 0.25, and once you get a site interview, your probability of getting a job offer is 0.3.

What is the probability of Pedro getting a job offer from Google?

3. The probability that someone smokes is 0.3. The probability that a smoker would eventually die of lung cancer is 0.1. What is the probability that a random deceased person would be a smoker who died of lung cancer?

4. In a certain class, the only bad habits are smoking and drinking.

- the probability that someone only drinks is 0.4
- the probability that someone only smokes is 0.2
- the probability that someone smokes and drinks is 0.1

Find

- (i) The conditional probability that someone doesn't smoke if it is known that he doesn't drink;
- (ii) The conditional probability that someone smokes if it is known that he doesn't drink;
- (iii) The conditional probability that someone smokes if it is known that he drinks.

5. In a certain school there are only three sports offered: football, basketball, and soccer.

- For each of the three sports, the probability is 0.1 that a student only plays that sport.

- For any two of the sports, the probability is 0.12 that a student plays these two sports but not the other
- The probability that a student plays all three sports, given that he plays football and basketball is  $\frac{1}{3}$

What is the probability that a student takes none of the sports, given that he does not take football?

**6.** A certain medical test is conclusive if you suffer from a certain rare disease, but gives you false positive if you are perfectly healthy with probability 5%. If 0.1% of the population get this disease, and someone was tested positive, what is the probability that he has the disease?

**7.** There are four sections of Probability, with section I having enrollment 40, section II having enrollment 60, section III having enrollment 70, section IV having enrollment 30.

- the probability of getting an A in section I is 0.2
- the probability of getting an A in section II is 0.1
- the probability of getting an A in section III is 0.3
- the probability of getting an A in section IV is 0.05

If someone told you that she was in one of the four sections, and that she got an A, what are

- (i) the probability that she was in section I ?
- (ii) the probability that she was in section II ?
- (iii) the probability that she was in section III ?
- (iv) the probability that she was in section IV ?

**8.** A certain very large math class has some students who took the calculus AP class. It is known that

- (i) 10% of the students did not take the AP exam.
- (ii) 30% scored 4 in the AP exam.
- (iii) the rest of the students scored 5 on the AP exam.
- (iv) 40% of the students who did not take the AP exam failed the class .
- (v ) 10% of the students who scored 4 on the AP exam failed the class .
- (vi) 1% of the students who scored 5 on the AP exam failed the class .

Given that the student passed the class, what is the probability that the student scored 4 on the AP exam?

**9.** The probability that a randomly chosen male has a circulation problem is 0.25. Males who have a circulation problem are twice as likely to be smokers as those who do not have a circulation problem.

What is the conditional probability that a male has a circulation problem, given that he is a smoker?