AP Statistics

M9Z

Chapter 6: Probability

Homework 7

1. It is estimated that 1% of the women population has a disease.
   The disease can be diagnosed with the use of a mammogram.
   For a woman who has the disease, the mammogram will return a positive result (indicating that the woman suffers from the disease) 80% of the time.
   For a woman who does not have the disease, the mammogram will return a negative result 90% of the time.
   If a woman receives a positive mammogram result, what is the probability that they have the disease?

2. A doctor is called to see a sick child. The doctor knows that 90% of the sick children have th flu, while the rest of the sick children have measles. Assume that there are no other illnesses going around. A well-known symptom of measles is a rash.
   More specifically, out of all the children who have contracted the measles, 95% of them will develop a rash. However, it is not uncommon for a child with flu to develop a rash. 80% of the children with flu will develop a rush.
   The doctor examines the sick child and she notices that the child has developed a rush. What is the probability that the child has measles?

3. A person uses his car 30% of the time, walks 30% of the time, and takes the bus 40% of the time as he goes to work. He is late 10% of the time when he walks; he is late 30% of the time when he drives; and he is late 7% of the time when he takes the bus.

   (i) What is the probability that he is late to work?

   (ii) If the person was late to work, what is the probability he took the bus?

   (iii) If the person was on time to work, what is the probability he walked?

4. Consider 3 coins where two are fair, yielding tails with probability 50%, while the third coin yields heads with probability 0.75. For simplicity, assume that the coins are numbered 1-3, and that coins 1 and 2 are fair, while coin 3 is tampered with.

(i) A coin is randomly chosen and flipped. What is the probability that it yields tails?

(ii) A coin is randomly selected and is tossed 3 times (the same coin), yielding 3 heads. What is the probability that the coin is tampered with?
You can safely assume that the outcomes of successive coin flips are independent.