

CSE21 Homework 5

Due: February 22, 2005

This is an **individual** homework assignment. Please answer all questions to the best of your ability, showing all work. **Please make sure that each problem is on a separate piece of paper, and that each piece of paper has your name and student ID number on it.**

1. $P(A) = 0.5$, $P(B) = 0.6$, $P(B|A) = 0.8$. Find $P(A|B) = ?$

2. (a) $P(A) = \frac{1}{4}$, $P(B|A) = \frac{1}{3}$, $P(A|B) = \frac{1}{2}$. $P(A \cup B) = ?$

(b) Given that $P(A) = p$, $P(B) = 1 - \varepsilon$. Prove

$$\frac{p - \varepsilon}{1 - \varepsilon} \leq P(A|B) \leq \frac{p}{1 - \varepsilon}.$$

3. An urn contains 15 white, 10 yellow, and 15 black marbles. A marble is chosen at random from the urn, and it is noted that it is not one of the black marbles. What is the probability that it is yellow?

4. A fair die is thrown twice, independently. Let x be the first score and y be the second score. Let $A = \{x + y = 10\}$ and $B = \{x > y\}$. Find: $P(A|B)$ and $P(B|A)$.

5. Two boxes are given as follows:

Box A contains 8 red balls, 2 white balls, and 2 blue balls.

Box B contains 2 red balls and 6 white balls.

A fair die is tossed: if a 3 or 6 appears, a ball is randomly chosen from A ; otherwise a ball is randomly chosen from B .

(a) Find the probability that the ball is:

(i) red, (ii) white, (iii) blue.

(b) Find the probability that box A was selected if the ball is red.

6. There are five coins in your pocket. One has both sides painted red and one has both sides painted yellow. Each of the other three coins has one side painted red and the other side painted yellow. Now you randomly take one coin out of your pocket and toss it on a table. You see that the face that is up is red. Given this observation, what is the probability that this coin is yellow on the other side?