

## CSE21 Homework 6

Due: March 8, 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.**

- Let  $A$  and  $B$  be events with  $P(A) = 0.4$ ,  $P(B) = 0.5$  and  $P(A \cup B) = 0.7$ . Are  $A$  and  $B$  independent? Prove your answer.
  - The probability that John hits a target is 0.6 and the probability that Eric hits a target is 0.5. They each fire once at the target. If the target is hit (either once or twice), find the probability that John hit the target.
- Two fair dice (one blue and one green) are thrown. Let  $D$  denote the difference of the numbers occurred on the blue die minus the value shown on the green die. Find the distribution and expectation of  $D$ .
- There are 100 items. 10 of them are defective. We select 2 items at random and let  $X$  denote the number of defective items selected. Find the distribution, the expectation and the variance of  $X$ .
- There are 7 white balls and 3 black balls in a box. A ball is randomly selected from the box without replacement. If it is not white, another ball is randomly selected without replacement, until a white ball is selected. Let  $X$  denote the number of balls selected. Find the expectation of  $X$ .
- Suppose a fair die is tossed. Let  $X$  be a random variable which is 1 if the number on the die is 4 or greater and 0 otherwise. Let  $Y$  be 0 or 1 accordingly as an odd or even number appears. Compute the covariance of  $X$  and  $Y$ .
- Two fair dice are thrown. Let  $X$  be the number appearing on the first die and  $Y$  be the number appearing on the second die.
  - Compute  $E[X]$  and  $Var[X]$ .
  - Compute  $E[X + Y]$ .
  - Compute  $Cov[X, X + Y]$ .