CS 171
Homework Assignment 4h

Given: February 09, 2012 **Due:** February 14, 2012

This assignment is due by the end of the class on the due date. Unless all problems carry equal weight, the point value of each problem is shown in [ ]. To receive full credit all your answers should be carefully justified. Each solution must be the student's own work. Assistance should be sought or accepted only from the course staff. Any violation of this rule will be dealt with harshly.

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1. Prove that, for any $n+1$ integers, $x_0, x_1, x_2, \ldots, x_n$, there exist two integers x_i and x_j with $i \neq j$ such that $x_i - x_j$ is divisible by n.

2. Consider the following experiment involving three dice. Below is a table that gives the probabilities with which each face shows up on each of the three dice.

	1	2	3	4	5	6
Die 1	1/6	1/6	1/6	1/6	1/6	1/6
Die 2	1/9	2/9	1/9	2/9	1/6	1/6
Die 3	1/9	1/6	1/3	1/6	1/9	1/9

We are interested in the event that the sum is odd sum when the three dice are rolled. We want to calculate the probability of this event systematically by answering the following questions. Note that a tree diagram representing this experiment must accompany your answers.
(a) What is the sample space of the experiment?
(b) What subset of the sample space is the event that the sum is odd when the three dice are rolled?
(c) What is the probability of each outcome?
(d) What is the probability of the sum being odd?

3. There are three distinct pairs of socks in Adrian's drawer. Waking up late for his 9 o'clock class, he randomly grabs two socks from the drawer without looking. What is the probability that he grabbed a matching pair of socks?

4. A fair coin is flipped 10 times.
(a) What is the probability that there are an equal number of heads and tails?
(b) What is the probability that the first three flips are heads?
(c) What is the probability that there are an equal number of heads and tails and the first three flips are heads?
(d) What is the probability that there are an equal number of heads and tails or the first three flips are heads (or both)?

5. Suppose that a (poorly proofread) book contains 300 pages and contains 20 mistakes. What is the probability that there is more than one mistake on page 1? Assume that each of the 20 mistakes is equally likely to be on any of the 300 pages.

6. Urn A contains two white balls and one black ball. Urn B contains one white ball and five black balls. A ball is drawn at random from urn A and placed in urn B. A ball is then drawn from urn B. It happens to be white. What is the probability that the transferred ball was white?