CS 171
Homework Assignment 4t

Given: February 07, 2012 **Due:** February 09, 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. Answer each of the following questions. You don't need to show your work.

A. Exercise 23.1 (b, c, d, f, h) (page 203) from the text.

B. (a) Let $A = \{1, 2, 3\}$ and $B = \{4, 5\}$. Let $f = \{(1, 5), (2, 4), (3, 4)\}$. Is $f : A \to B$ one-to-one? Is it onto?

(b) Let $A = \{1, 2\}$ and $B = \{3, 4, 5\}$. Let $f = \{(1, 5), (2, 3)\}$. Is $f : A \to B$ one-to-one? Is it onto?

(c) Let $A = \{1, 2\}$ and $B = \{3, 4\}$. Let $f = \{(1, 4), (2, 3)\}$. Is $f : A \to B$ one-to-one? Is it onto?

C. Exercise 23.5 (page 204) from the text.

2. A spider has one sock and one shoe for each of its eight legs. In how many different orders can the spider put on its socks and shoes, assuming that, on each leg, the sock must be put on before the shoe?

3. Give a combinatorial proof of the following identity. For any non-negative integer n

$$\sum_{k=0}^{n} \binom{n}{k}^2 = \binom{2n}{n}$$

(*Hint: Consider a set S of n distinct red objects and n distinct blue objects. Based on this information and the expression that needs to be proven, ask a counting question and answer it in two different ways.*)

4. Prove that of any five points chosen within a square of size length 2, there are two whose distance apart is at most $\sqrt{2}$.