COMP 170 Discrete Mathematical Tools for CS
2008 Fall Semester – Written Assignment # 1
Distributed: Sept 4, 2008 – Due: Sept 11, 2008

At the top of your solution, please write your (i) name, (ii) student ID #, (iii) email address and (iv) tutorial section.
<u>Some Notes:</u>

- Please write clearly and briefly. For all questions you should also provide a short explanation as to *how* you derived the solution. That is, if the solution is 20, you shouldn't just write down 20. You need to explain *why* it's 20.

- Please follow the guidelines on doing your own work and avoiding plagiarism given on the class home page. Don't forget to *acknowledge* individuals who assisted you, or sources where you found solutions.

- Some of these problems are taken (modified) from section 1.1 of the textbook.

- Please make a *copy* of your assignment before submitting it. If we can't find your paper in the submission pile, we will ask you to resubmit the copy.

- Your solutions should be submitted before 5PM of the due date in the collection bin in front of Room 4213A (this is near the TA labs).

Problem 1: Ten schools are going to send their basketball teams to a tournament at which each team must play each other team exactly once. How many games are required?

Problem 2: In how many ways can a twelve-person club select a president and a secretary-treasurer from among its members?

Problem 3: In how many ways can a twelve-person club select a two-person executive committee from among its members?

Problem 4: In how many ways can a twelve-person club select a president and a two-person executive advisory board from among its members (assuming that the president is not on the advisory board)?

Problem 5: Using the formula for $\binom{n}{2}$ it is straightforward to show that

$$n\binom{n-1}{2} = \binom{n}{2}(n-2)$$

However, this proof simply uses blind substitution and simplification. Find a more conceptual explanation of why this formula is true. (Hint: Think in terms of officers and committees in a club.)

Problem 6: The local fast food restaurant has a promotion in which they give you a Snoopy doll everytime you buy a meal. There offer 15 different Snoopy dolls and, each time you go, you can choose whichever doll you want.

You and your friend go into the restaurant and each buy a meal, so you get two Snoopy dolls. You then go home and give both dolls to your 8 year old niece as a present.

How many different two-doll presents are there?

Note that for this problem, *order doesn't matter*. That is, a present of a "doctor-doll and teacher-doll" is the same as a a "teacher-doll and doctor-doll". Also, don't forget to count presents in which both dolls are the same.