COMP 170 Discrete Mathematical Tools for CS
2010 Spring Semester – Written Assignment # 1
Distributed: Feb 4, 2010 – Due: Feb 11, 2010

Your solutions should contain (i) your name, (ii) your student ID #, (ii) your email address and (iv) your tutorial section.
Some Notes:

- 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: Six 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 nine-person club select a president and a secretary-treasurer from among its members?

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

Problem 4: In how many ways can a nine-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 ice cream shop sells eleven different flavors of ice cream. How many different two-scoop cones are there? (Following your mother's rule that it all goes to the same stomach, a cone with a vanilla scoop on top of a chocolate scoop is considered the same as a cone with chocolate on top of vanilla.)

Problem 7: Suppose you decide to disagree with your mother in Problem 6 – the order of the scoops does matter. How many different possible two-scoop cones are there? (In this case note that cones with two scoops of the same flavour, e.g., two scoops of vanilla, should only be counted once.)