

**COMP 2711 Discrete Mathematical Tools for CS**  
**2014 Fall Semester – Written Assignment # 1**  
**Distributed: September 11, 2014 – Due: September 18, 2014**

Your solutions should contain (i) your name, (ii) your student ID #, (iii) 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.
- 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 outside Room 4210A (Lift 21).

**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? (The two scoops might be of the same flavor or of two different flavors. 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.)