IS2150/TEL2810 Introduction to Security
Homework 2
Total Points: 50
Due Date: September 20, 2007

1) Exercise on Propositional/Predicate logic   **[25 Points]**

   (a) Prove that $A \oplus B \Leftrightarrow (A \wedge \neg B) \vee (\neg A \wedge B)$ (you can use the truth table)

   (b) Express the following sentences in propositional//first order logic. Be sure to define all propositional components (e.g., predicate function, constants, and variables).

      i)   If it rains we will not go to the Steeler's game.
      ii) If a subject has *Top Secret* clearance then he/she is allowed to *read* all *Top Secret* and *Secret* files.
      iii) If a subject has *Secret* clearance then he/she is allowed to *write* to *Secret* and *Top Secret* files
      iv) A person can *approve* a check or *cash* it but cannot do *both*.
      v)   Not all *files* are text *files*.
      vi) A *directory* is older than the *directories* and the *files* that it contains.

2) Prove by induction the following statements: **[20 Points]**

      i) $(n^3 + 2n)$ is *divisible by* 3, *where n is a natural number.*
      ii) $S(n): 1^2 + 2^2 .. + n^2 = n(n +1)(2n + 1)/6$

3) Assume that when a file is created and before the **umask** value has been applied, the permission bits are 0626 (in class we assumed 0777). What will be the permission setting for the new files when the following **umask** values are applied   **[5 Points]**
      i)   022
      ii) 033
      iii) 051