**Logic in Computer Science Coursework 1**

**Date of Handout: Saturday 09 October 2018**

**Date of Submission: Friday 15 October 2018**

**Instructions**

1. **Submission should be made in the format of PDF by email to Dr. Bo Liu <** **liubocq@swu.edu.cn>**
2. **The PDF should be made by Microsoft Word or LaTex.**
3. **Late submission without giving an acceptable in advance will be recorded as a mark of 0 (zero).**
4. **Discussions on the understanding of the questions are encouraged, but plagiarism is strictly not allowed.**
5. Instead of defining a subset of a set in terms of membership, we take the following definition

* A* is a subset of *B* if

Prove this is equivalent to the original definition, i.e. A is a subset of *B* according

to the above definition iff

* A* issubset of B iff for any *a*,

1. Prove



1. Show that the set of all even numbers are countable (define a bijiection from this set to the set of natural numbers *N*).
2. Let U be the assumed universal set, for any subset V, define Ac = U-A. Show the following laws, for any subsets A and B of U

(A∪B)c = Ac∩Bc  (A∩B)c = Ac∪Bc

1. Prove A∩B=B-(B-A)
2. Given a finite universal set U of n elements. Represent a subset *A* of U with the bit string of length *n*, where the *i*th bit in the string is 1 if *ai* belongs to *A* and is 0 if *ai* does not belong to *A*. Let *U* = {1,2,3,4,5,6,7,8,9,10}, and the ordering of elements of *U* has the elements in increasing order; that is *ai* = *i*.
   1. What bit string represents the subset of all odd integers in *U*?
   2. What bit string represents the subset of all even integers in *U*?
   3. What bit string represents the subset of all integers not exceeding 5 in *U*
   4. What bit strings represent the union, intersection and difference of each pair of the above subsets?
3. Discuss how to represent a Class as relation (thus, a set) in a Java program. Use examples to demonstrate your argument.