CSC/MAT-220: Discrete Structures

Homework 2

Due: 9/8/2017

Book Problems

Please do each of the following problems from your book:
8.12, 9.7, 9.18, 10.13, and 12.21.

Other Problems

I. Write the following definitions and their negation using quantifiers and logical symbolism.

   a. A function $f\colon D \to \mathbb{R}$ is *continuous* at $c \in D$ if and only if for every $\epsilon > 0$ there exists a $\delta > 0$ such that $|f(x) - f(c)| < \epsilon$ whenever $|x - c| < \delta$ and $x \in D$.

   b. A function f is *uniformly continuous* on a set S if and only if for $\epsilon > 0$ there is a $\delta > 0$ such that $|f(x) - f(y)| < \epsilon$ whenever x and y are in S and $|x - y| < \delta$.

II. Prove the following statement:
   Let A be a subset of U, then $A \cup (U - A) = U$.

III. Let f_n denote the number of ways to tile a board of n squares, using squares and dominoes (two squares joined together). Give a combinatorial proof for each of the following propositions.

   i. For $n \geq 0$, $f_0 + f_1 + f_2 + \cdots + f_n = f_{n+2} - 1$.

   ii. For $n \geq 0$, $f_0 + f_2 + f_4 + \cdots + f_{2n} = f_{2n+1}$.

   iii. For $n \geq 1$, $f_1 + f_3 + \cdots + f_{2n-1} = f_{2n} - 1$.