CSC410, Fall 2016 - Homework 1

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Problem 1

(a) It does not hold. Since a[0] is just an integer without any constraint.

(b) It does not hold, since i == 0 is not a loop invariant.

(c) It holds.

(d) It does not hold. Since it is checking for integer j whether j is smaller then the length of integer array a, but obviously that not every integer j will satisfy such condition.

(e) It holds.

(f) It holds.

(g) It does not hold, since every element of array a is 0.

Problem 2

(a) //@ assert x >= 0 && x*x == y;

(b) //@ assert b[0] >= 'A' && b[0] <= 'Z';

(c) //@ assert a[a.length-1] >1000;

(d) //@ ensures x = 2 * \old(x);

(e) //@ ensures (\max int j; j >= 0 && j < a.length; a[j]) && \result == j;

(f) /*@ assert (\forall int i; 0 <= i && i < a.length && i % 2 == 0; a[i] % 2 != 0); @*/

(g) /*@ assert (\forall int i; 0 <= i && i < b.length ; 'a' <= b[i] && b[i] <= 'z'); @*/

(h) //@ assert(\forall int j; 0 <= j && j < i-1; a[j] < a[j+1]);

Problem 3

(a) //@ assert(\forall int i; 0 <= i && i < b.length; b[i] = \old(b[i]));

(b) /*@ assert \result == (\sum int i; i >= 0 && i <= a.length && i % 2 == 0; a[i]); @*/