**IIT CS536: Science of Programming**

Homework 6: Loop Bounds and Array Assignments

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**Task 1.1**

Now let’s complete proof obligations:

This obligation holds since is equal to and . and others also holds since they are weaker than preconditions.

In this proof obligation is definitely less than and holds since ensures that and also holds since we are adding 1 to both sides.

1. the first part holds as we saw in the previous step holds since implies that will be at least . The rest also holds perfectly.
2. this also holds since,

**Task 1.2**

**Task 1.3**

1. not valid because it is smaller than t and may be even negative. Also it might reach 0 before all the iterations are completed.
2. is a valid loop bound because it’s bigger than t and as it’s square of a valid expression it’s always positive.
3. this is not valid expression as maybe opposite of t or may be negative but greater than t in absolute value . This means which is invalid.
4. this is valid bound expression as is always positive and adding it to will results in bigger number which is fine.
5. is also invalid because k might be a negative number whose absolute value maybe bigger than making the bound expression negative or not fit to represent number of iterations.
6. is valid bound expression and adding positive number just makes expression bigger which is fine.

**Task 2.1**

**Task 3.1**

I spent around 10 hours for this assignment.