**IIT CS536: Science of Programming**

Homework 5: Loop Invariants and Proof Outline

Prof. Stefan Muller

Submitted by: Abdurakhmon Urazboev

**Task 1.1**

The first proof obligation that we need to prove is this proof obligation do not work for values of since and Will not hold for .

The next proof obligation we have is this proof obligation do not work as we have If we apply this So it will not hold.

The last proof obligation does not hold as we know 0 is not a factiorial of any number even .

**Task 1.2**

So, having this proof outline we need to show 3 proof obligations:

1. if is equal to 0 and is 1 then Holds as . Since this implies that so proof obligation works.
2. The second proof obligation is the first part holds as And if we multiply both sides to any number equation should hold so . In the second part we have this means the gap between them is at least 1. So will also hold.
3. The last proof obligation is very simple. It’s just obvious that if is equal to then this will hold

**Task 2.1**

A computer screen with text and symbols

Description automatically generated

**Task 2.2**

A computer screen shot of a program code

Description automatically generated

**Task 3.1** I spent around 12 hours for this assignment.