

Homework 01

Problem 1 Hoare Logic

Consider the following Hoare triple:

```
{true}
x := n; y := m;
(if 0 ≤ n then z := -1 else z := 1);
{I}
while x ≠ 0 do
  y := y + z; x := x + z;
{y = m - n}
```

- Give the Hoare proof of validity.
- Find an appropriate invariant I for a proof of validity of the Hoare triple.

Problem 2 Weakest Preconditions

Consider the following command c :

```
if (x > 1 ∧ isEven(x)) then x := x/2
  else if (x > 1) then x := 3 * x + 1
  else x := 1;
```

For the state $A = \{x = 1\}$ compute the weakest preconditions for the command c . The resulting formula $WP(c, A)$ should not contain quantifiers, and the only variables in $WP(c, A)$ should be those that exist in the original command.