VU Programm- und Systemverifikation
Homework: Hoare Logic

May 27, 2015

Task 1 (8 points): Prove the Hoare Triple below (assume that the domain of all variables in the program are the natural numbers including 0). You need to find a sufficiently strong loop invariant. Annotate the following code directly with the required assertions. Justify each assertion by stating which Hoare rule you used to derive it.

{true}

```
if (x > y) {

  a = x;

  b = y;

} else {

  a = y;

  b = x;

}

while ((a-b)>0) {

  a = a-1;

}
```

$\{a = b\}$

Task 2 (7 points): Prove the Hoare Triple below (assume that the domain of all variables in the program are the integers, and that `N` is a positive constant). You need to find a sufficiently strong loop invariant. Annotate the following code directly with the required assertions. Justify each assertion by stating which Hoare rule you used to derive it.

$\{\mathsf{true}\}$

```
x := N;

y := 0;

while (x > 0) {

  x = x - 1;

  y = y + 1;

}
```

$\{\mathtt{y} = \mathtt{N}\}$

Upload a pdf file with your solutions to TUWEL by June 10, 2015.