

VU Programm- und Systemverifikation

Homework: Hoare Logic

April 13, 2015

Task 1: 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: 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.

$\{\text{true}\}$

$x := N;$

$y := 0;$

$\text{while } (x > 0) \{$

$\quad x = x - 1;$

$\quad y = y + 1;$

$\}$

$\{y = N\}$

Upload a pdf file with your solutions to TUWEL by June 8, 2014.