HW7

Question 1 Consider the following program, that takes as its input `x` and computes the factorial of x.

```
{x >= 0}        /*precondition*/
t := x;
z := 1;
while t > 0
  begin
    z := z*t;
    t := t-1;
  end
  {z = x!}          /*postcondition*/
```

1. Define a loop invariant? What is the loop invariant for the while loop in the above program?
2. Prove that the above program correctly computes what it is supposed to compute using Hoare's method.

Question 2

Consider the function:

$$f(x, y) = \ if\ x = y\ then\ y + 1\ else\ f(x, f(x - 1, y + 1))$$

Show that its LFP is

$$g(x, y) = \ if\ (x - y) = 2n\ and\ n \geq 0\ then\ x + 1\ else\ \perp$$