Programering

## Exercises

(1) Write down a proof that the following recursive factorial function is correct using *proof by induction*. Put your inductive proof into a pdf file (`text_answers.pdf`). *Hint:* review the lecture slides for the two components of a proof by induction, i.e. (a) the base case and (b) the inductive step.

```
/* Factorial function definition */
int fact(int n)
{
  /* pre-condition */
  assert (n >= 1);

  /* post-condition */
  if(n > 1)
    return n * fact(n - 1);
  else
    return 1;
}
```

Proof by induction is we need to prove that the claim is true from $1 \rightarrow n$.

First, we test for 1 (base case)

We insert 1

It can go through the assert because $1 = 1$=true

Does not do the if statement because 1 aren't over 1=false

So we go to the else statement where it returns $1 \rightarrow true$

Then we prove that the claim is true for the inductive step.

We insert 2

Assert is tried because 2>=1=trye

Does do the statement 2>1=true

Returns= $2 \cdot fact(2-1) = 2$=true