Week 11 hand-in

Exercise 1

First, we define how factorial works. The factorial of a specific number is calculated by multiplying the number *k* with the numbers smaller than itself, i.e. $k! = k * (k-1) * (k-2) * ... * 1$. An example is the factorial of 3 which is $3! = 3 * 2 * 1 = 6$. Furthermore, this shows that the factorial of a number can be calculated by multiplying *k* with the factorial of *k-1* ($k! = k * (k-1)!$).

Now, we check whether the base case is correct. In the *fact* function, it returns 1 if the input *n* is 1. This makes sense, since the factorial of 1 equals 1 ($1! = 1$). The base case is there for correct.

Moving on to the inductive step, the inductive hypothesis would be as follows: For an integer $k > 1$, we assume that *fact(k-1)* correctly calculates the factorial of the number (*k-1)*, denoted as $(k-1)!$. Then:

$$fact(k) = k * fact(k-1)$$

$$= k * (k-1)!$$

This is the definition of calculating the factorial of an integer, and therefor *fact* calculates *n!*, for all integers $n \geq 1$.