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Week 11: Verifying Correctness of Recursive Programs

Exercise 1 - Inductive proof of factorial program

First of all, it is assumed that $n \geq 0$. Secondly the base case is determined by inserting 1 into the function:

$$fact(1) = 1 = 1!$$

Since the base case equals the expected number, it is assumed to be true. Because the base case is true, it is also assumed that the following must be true:

$$fact(n - 1) = (n - 1)!$$

If the former is assumed to be true, then the following must also be true:

$$n * fact(n - 1) = n * (n - 1)!$$

The mathematical expression to calculate a factorial number is:

$$n! = n * (n - 1) * (n - 2) * (n - 3) *\ldots* 3 * 2 * 1 = n * (n - 1)!$$

Which is what was assumed to be true.

Exercise 2, 3, and 4 - Various

https://github.com/Aarhus-University-ECE/assignment-11-A-Emilia