

Functional Programming

Exercises Week 7

(for November 25, 2016)

1. Read Chapter 6 of the lecture notes.
2. Exercise 6.1
3. Prove by mathematical induction that for all $n \geq 3$,

$$3^n \geq n^3$$

4. Prove by structural induction that

$$\text{length} (\text{reverse } xs) = \text{length } xs$$

where `length` and `reverse` are defined as follows:

```
let rec length = function [] -> 0
                       | _::xs -> 1 + length xs
```

```
let rec reverse = function [] -> []
                       | x::xs -> (reverse xs) @ [x]
```

Hint: You may use Example 6.2:

$$\text{length } xs + \text{length } ys = \text{length } (xs @ ys)$$

5. Exercise 6.16