Algorithms and Data Structures
Winter Term 2015/16
Exercises for Unit 7

In the exercises of this problem set you may assume that you have an algorithm available that computes the product of two degree-n polynomials in time $O(n \log n)$.

1. In class we showed how a polynomial f of degree $n-1$ can be simultaneously evaluated at n different values in time $O(n \log^3 n)$. This relied on the fact that if a is a root of a polynomial d then $f(a) = r(a)$, where r is the remainder of f divided by d.

   Show that actually a time bound of $O(n \log^2 n)$ can be achieved.

2. Show that $n!$ can be computed (as a real number) in time $O(\sqrt{n} \log^2 n)$ without the use of floor operations, i.e. no conversions from reals to integers, etc.