Prof.Dr.W.Koepf
Dr. E. Nana Chiadjeu   Exercise to the Lecture
Exercise sheet 10   **COMPUTER ALGEBRA I**   **11.07.2013**

U N I K A S S E L
V E R S I T Ä T

Aufgabe 1: (DFT)

We have seen in the lecture how to use the discrete Fourier transformation in order to multiply two polynomials. Program the function

(a) `PolyMultFT[f,g,x]` which computes the product of two random polynomials $f(x)$ and $g(x)$ using the discrete Fourier transformation.

(b) `PolyMultCP[f,g,x]` which computes the product of two random polynomials $f(x)$ and $g(x)$ using the Cauchy-product formula.

(c) For which degree $(\deg(f(x), x) = \deg(g(x), x))$ which programm is faster? You should use numerical coefficients!

(8 points)

Aufgabe 1: (Sieve of Eratosthenes)

The sieve of Eratosthenes (see http://en.wikipedia.org/wiki/Sieve_of_Eratosthenes) is one of the oldest ways to find all of the smaller primes (below 10 million or so). It finds them by eliminating successively the multiples of the prime numbers $2, 3, 5, \ldots, \lfloor\sqrt{n}\rfloor$ (except the chosen prime itself) from the list $\{2, 3, \ldots, n\}$.

(a) Explain why this method determines all the prime numbers between 2 and n?

(b) Write a program `Eratosthenes`, which takes as input the list $\{2, 3, \ldots, n\}$ and returns all the prime numbers between 2 and n (also as a list).

(8 points)