Universität Erlangen-Nürnberg Department of Computer Science 7 Dr.-Ing. U. Klehmet Introduction to Data Structures and Algorithms

## Exercise sheet 3

## Exercise 3:

Let  $f_i$  bet he i-th Fibonacci number (i = 0,1,2,...).

Let 
$$\phi = \frac{1+\sqrt{5}}{2}$$
 and  $\widehat{\phi} = \frac{1-\sqrt{5}}{2}$ 

( $\phi$  is known as the golden ratio and  $\widehat{\phi}$  as its conjugate). Prove by induction that  $f_i = \frac{\phi^i - \widehat{\phi}^i}{\sqrt{5}}$ !

## Exercise 4:

- a) Show that  $\frac{1}{3}n^3 2n^2 + 5n 2 = \Theta(n^3)$ .
- b) Show that for any constants  $a, b \in \Re$ , where b > 0, we have  $(n+a)^b = \Theta(n^b)$ .