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

## Exercise sheet 3

## Exercise 3:

Let $f_{i}$ bet he i-th Fibonacci number ( $i=0,1,2, \ldots$ ).
Let $\phi=\frac{1+\sqrt{5}}{2} \quad$ and $\quad \hat{\phi}=\frac{1-\sqrt{5}}{2}$
( $\phi$ is known as the golden ratio and $\bar{\phi}$ as its conjugate). Prove by induction that $f_{i}=\frac{\phi^{i}-\hat{\phi}^{i}}{\sqrt{5}}$ !

## Exercise 4:

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

