Norwegian University of Science
and Technology
Institutt for matematiske fag

MA0301 Elementary discrete mathematics Spring 2017

Exercise set 5

1 Basic exercises

1 1) Find the appropriate values of n_0 such that $n^2 - 6n + 8 \geq 0$. Then show that the statement is true for all $n \geq n_0$.

2) Find the appropriate values of n_0 such that $n^3 \geq 6n^2$. Then show that the statement is true for all $n \geq n_0$.

2 Use the alternative principle of induction to show that if u_n is defined recursively by the rules $u_1 = 1$, $u_2 = 5$ and for all $n > 1$

$$u_{n+1} = 5u_n - 6u_{n-1}$$

then $u_n = 3^n - 2^n$ for all $n \in \mathbb{N}$.

3 Grimaldi's book (5. ed., Exercises 4.2): solve **Exercise 1 b,d,f**

4 Grimaldi's book (5. ed., Exercises 4.2): solve **Exercise 12**

5 Grimaldi's book (5. ed., Exercises 4.2): solve **Exercise 13**

6 List 5 examples of objects that are counted by the Catalan numbers, e.g., the number of complete parenthesizations of words in $n + 1$ letters. For the four letter word $w = abcd$ you'll find $C_3 = 5$ parenthesizations

$$(ab)(cd),\ ((ab)c)d,\ (a(bc))d,\ a(b(cd)),\ a((bc)d)$$