

# Algebra 1 (2012)-Aalborg University

## Lecture 13, October 18th

**13th Lecture:** Thursday October 18th. I will not be present during this lecture.

- Work in groups. Exercises: Solve the exercises from lecture 11 that you have not solved yet + Exercises 2.16, A, 2.17 from [Lau].

Exercise A: Let  $G$  be the quaternion group and  $H = \{\mathbf{1}, -\mathbf{1}\}$ . One has that  $G = \{\mathbf{1}, -\mathbf{1}, \mathbf{i}, -\mathbf{i}, \mathbf{j}, -\mathbf{j}, \mathbf{k}, -\mathbf{k}\} \subset GL_2(\mathbb{C})$ , where

$$\mathbf{1} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \mathbf{i} = \begin{pmatrix} i & 0 \\ 0 & -i \end{pmatrix}, \mathbf{j} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}, \mathbf{k} = \begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix}.$$

1. Prove that  $H$  is a subgroup in  $G$ .
2. Prove that  $H$  is normal in  $G$ .
3. Write the composition table for  $G/H$ .

Each group can write their solution for two exercises and leave it in my mailbox (just one set of exercises per group).

- Lecture: This part will consist of self-study. One topic is “Relations” (section A.1 and A.2, pages 223–227). Compare the contents of this lecture with the previous concepts studied in this course (see the slides). Another topic is Dihedral group, Orthogonal group and Example 2.5.2 (Examples 2.4.6, 2.4.7 and 2.5.2). You are welcome to orientate me, by e-mail, about the successes and difficulties during the lecture.

Best regards,

Diego