

# SF2729 Groups and Rings

## Problem set 3

due: Tuesday Nov 25 in class.

Write clear, clean, brief, and complete solutions and use whole sentences. Solutions without proper reasoning score worse. You can submit hand-written or typed solutions and turn them in in class or send them by email to `tilmanb@kth.se`. I will not accept late homework except under extraordinary circumstances that you need to discuss with me before the deadline.

**Problem 1.** Show that the groups  $SL_2(\mathbf{Z}/3\mathbf{Z})$  and  $S_4$  have the same order, but are not isomorphic.

**Problem 2.** Determine all subgroups of the dihedral group  $D_{14}$  and draw their subgroup lattice. Give short (one-sentence) arguments why your groups are subgroups and why there are no other subgroups.

**Problem 3.** Given natural numbers  $m$  and  $n$ , how many homomorphisms are there from  $\mathbf{Z}/m\mathbf{Z}$  to  $\mathbf{Z}/n\mathbf{Z}$ ?