# Homework 2, Math 401

due on Feb 8, 2021

Before you start, please read the syllabus carefully.

1. Using Euclidean's algorithms to determine the greatest common divisor $d$ of 2310 and 13, and find integers $m$ and $n$ such that $d = 2310m + 13n$.

2. Find all subgroups of $C_{50}$.

3. Write down all elements in $S_4$ in the format of e.g. (1234).

4. Find all subgroups $H_i$ of $S_4$, and determine for each $i$, whether $H_i$ is normal subgroup of $S_4$ or not.

5. Prove that for abelian group $G$, every subgroup is a normal subgroup.

6. Prove that $A_n$ is a normal subgroup in $S_n$.

7. Let $G$ be a group and $H$ be a subgroup of $G$. Prove that the relation $a \sim b$ if and only if $aH = bH$ is an equivalence relation among elements in $G$.