14-1100 Sep 8, hours 1-2: Non Commutative Gaussian Elimination

September-11-11 6:11 PM

MAT 1100 Core Algebra. **To do.** 1. print "About".
2. print NCGE. (two sides)

DROR BAR-NATAN

on board

Goal: Within your lifetime, understand $G=\langle g_1 \dots g_m \rangle \subset S_n$:
1. $|G|=?$ 2. $\sigma \in G$? 3. $\sigma = W(g_1, \dots g_m)$ 4. random

Two pre-requisites 1. Groups, S_n, silly uniquenesses, cancellation, $(ab)^{-1}=b^{-1}a^{-1}$, subgroups, the subgroup generated by $\{\sigma_2\}$.

2. Row reduction for real.

$f \cdot g = fog$

Example $\sigma_1 = (123) = 2314$ $\sigma_2 = (12)(34) = 2143$, in S_4

11 I		
12 $\sigma_1 = 2314$	1 22 I	
13 $\sigma_{12}^2 = 3124$	2 23 $\sigma_{12}^{-1}\sigma_2 = 1342$	3 33 I
14 $\sigma_{23}\sigma_{13} = 4132$	5 24 $\sigma_{13}^{-1}\sigma_{23}\sigma_{12} = 1423$	4 34 I
		44 I

Feed $\sigma_1 = 2314$ ... Fed @ σ_{12}

Feed $\sigma_{12}^2 = 3124$ ... Fed @ σ_{13}

Feed $\sigma_2 = 2143$ ... Feed $\sigma_{12}^{-1}\sigma_2 = 1342$ .. Fed @ σ_{23}

Feed $\sigma_{12}\sigma_{23} = 2143$ ... Feed $\sigma_{12}^{-1}\sigma_{12}\sigma_{23} = \sigma_{23}$ ....

No point feeding $\sigma_{i,j}\sigma_{k,l}$ if $i<k$?

Feed $\sigma_{23}\sigma_{12} = 3412$ ... Feed $\sigma_{13}^{-1}\sigma_{23}\sigma_{12} = 1423$ ... to σ_{24}

Feed $\sigma_{23}\sigma_{13} = 4132$ .. to σ_{14}

Feed $\sigma_{24}\sigma_{12} = 4213$ ... Feed $\sigma_{14}^{-1}\sigma_{24}\sigma_{12} = 1423$ ... drop.

$\Rightarrow |G| \geq 4 \cdot 3 \cdot 1 \cdot 1 = 12$. Is $4123 \in G$?

write 2431 in terms of $\sigma_{1,2}$.

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* Go over the "about" handout.