Nov 26-30 (Soft deadline friday Sept 28, hard deadline Nov 2). Presentations:

MT1: Median 49

(yesterdy: Aut, (Z/2) = Z/(r-0Z)

Aut (W) Aut $(\mathbb{Z}/_{12}\mathbb{Z}) = ?$

$$Aut_{Jr}(\mathbb{Z}/_{12}\mathbb{Z})=?$$

1 --- any of the $\phi(12) = 4$ elements 1, 5, 7, 11.

So Autgr (Z/2Z) = Z/4 or Z/2 × Z/2.

$$1 \longrightarrow 1$$

$$1 \longrightarrow 5 \longrightarrow 2^{\frac{1}{5}} \text{ and. of order } 2$$

$$1 \longrightarrow 7 \longrightarrow 4$$

$$1 \longrightarrow 1 = -1 \longrightarrow 1$$

Lemma: If C is a cyclic group, Anty (G) is a belian. I has the form of the taustres garden

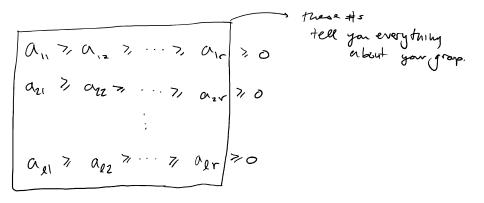
$$\varphi_{k} \cdot \varphi_{\ell} = \varphi_{k+\ell} = \varphi_{\ell} \cdot \varphi_{k}$$

 $\exists x : Aut(Z^2) \cong SL_{r}(Z).$ not cyclic.

Recall Gabelinn, |G|=n=p, p,

(1)
$$G = P_1 \times P_2 \times \dots \times P_e$$
; $|P_i| = P_i^{a_i}$ sylow r-subgroups

(2)
$$P_j \cong \mathbb{Z}_{p_{ji}^{\alpha_{ji}}} \mathbb{Z} \times \cdots \times \mathbb{Z}_{p_{ji}^{\alpha_{jin}}} \mathbb{Z}$$
 S.t. $\sum_{i=1}^{n_j} \alpha_{ji} = \alpha_j$, $\alpha_{j1} > \alpha_{j2} > \cdots > \alpha_{jn_j}$.



$$rac{a_1}{2}$$
 $|C| = |S| = 2 \cdot 3^2$ $P_1 = 2$ $A_1 = 1$

result we're using:

$$\frac{\mathbb{Z}/m_1 \mathbb{Z} \times \mathbb{Z}/m_2 \mathbb{Z}}{\text{iff } (m_1, m_2) = 1}.$$

So it's o mad ming.

So using table. Jefine
$$N_{1} = P_{1}^{a_{11}} P_{2}^{a_{21}} ... P_{\ell}^{a_{\ell}}$$

$$N_{2} = P_{1}^{a_{12}} P_{2}^{a_{21}} ... P_{\ell}^{a_{\ell}}$$

$$N_{3} = P_{1}^{a_{12}} P_{2}^{a_{21}} ... P_{\ell}^{a_{\ell}}$$

So
$$G \cong \mathbb{Z}/n_1\mathbb{Z} \times \cdots \times \mathbb{Z}/n_r\mathbb{Z}$$
. Theorem if Gisabelian and $N_r \mid N_{r-1}$, $N_{r-1} \mid N_{r-2}$, ..., $N_2 \mid N_1 \mid 16l = n$.

Corollary: Exponent of a group $G = \max \left\{ \operatorname{ord}(x) : x \in G \right\}$ and this is M_1 in the above theorem.

Also, if $m = \exp(G)$ then $T^m = e$ for all $T \in G$.

 \Rightarrow order $(\tau') = \text{K-gcd}(r, m) > m \text{ if } r \neq 0$.

Ex: use this argument to prove the theorem directly!