Suppose $H \leq G$

Let $K = xHx^{-1}$ for some $x \in G$

Claim $K \leq G$

Pick $a, b \in xHx^{-1} \Rightarrow a = xh_1x^{-1}$

$b = xh_2x^{-1}$

Look @ $ab^{-1} = (xh_1x^{-1})(xh_2x^{-1})^{-1} =$

$(xh_1x^{-1})(xh_2^{-1}x^{-1}) =$

$xh_1\underbrace{x^{-1}x}_{e}h_2^{-1}x^{-1} = x\underbrace{h_1h_2^{-1}}_{h_3}x^{-1}$

$= xh_3x^{-1} \in \underline{xHx^{-1}}$ ∎

If $H = xHx^{-1} \Rightarrow \underbrace{xH = Hx}_{\text{normal}}$

Corollary: Self-conjugate iff normal ∎

Sylow's 3rd Thm: $|G| = p^k m$

$n_p \equiv N(p) = \#$ Sylow subgps of ~~ordor~~ p^k

$N(p) \equiv 1 \ (p)$ & $N(p) \mid m$

$|G| = |S_3| = 6 = 2 \cdot 3$

2-SSG's & 3-SSG's

$H_1 \leq S_3 \qquad H_1 = \{(1), (1\,2)\}$

$H_2 = \{(1), (1\,3)\}$

$H_3 = \{(1), (2\,3)\}$

$(1\,\underline{3})\{(1), (\underline{1}\,2)\}(1\,3)^{-1} =$

$\{(1), (2\,3)\}$ YES!

1	2	3
3		1
3	1	2
1	3	2

How many 2-SSG's

$p^k m = |G|$

$p = 2 \quad m = 3$

(i) $N(2) \equiv 1 \mod 2$

(ii) $N(2) \mid 3$

$N(2) = 1, 3$

$|G| = 40 = 2^3 \cdot 5$

(i) $N(2) \equiv 1 \mod 2$

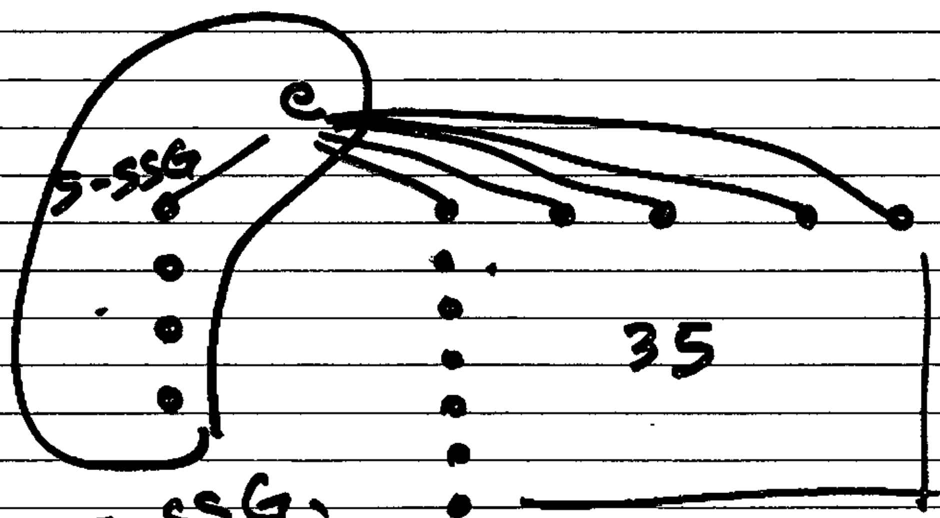
$N(5) \equiv 1 \mod 5$

(ii) $N(2) \mid 5$

$N(5) \mid 8 \longrightarrow N(5) = 1$

$N(2) \equiv 1 \mod 2$

$N(2) \mid 5$



1 5-SSG,

5 2-SSGs