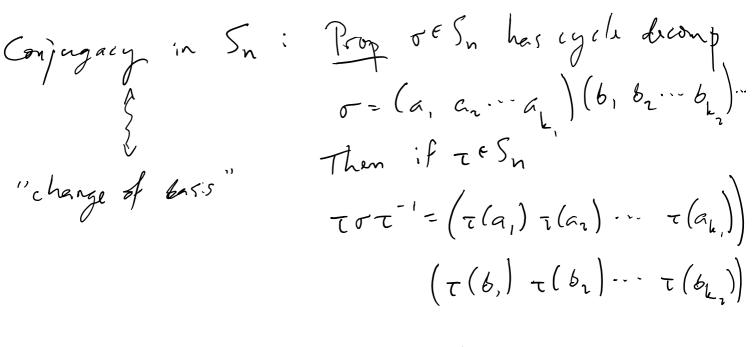
Lecture 15

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 $G \oslash X$ Prodlem 8 GOGleft mult $\xrightarrow{F} X$ s.t. $\xrightarrow{\gamma} g \cdot F(a) = F(g \cdot a)$ g:a G/H 4 ≤ km (GOX) Fexists iff Claim Yhet. VxeX F(qH) = F(q) $F(g'H) = F(g')_{i,n}, \quad g = g'h, \quad h \in H$ $F(g'h) = F(g') \forall g' \in G, h \in H.$ so need F(L) = F(I)g'.F(h) g'.F(1) the H



Pf If
$$\sigma(i) = j$$
, then $\tau \sigma \tau^{-1}(\tau \kappa i) = \tau \sigma(i)$
 $= \tau(j) \quad 6/c \quad \sigma(i) = j$. \Box
Defin If $\sigma \in S_n$ is the product of disjoint cycles
(including 1-cycles potentially) of length n_i, n_2, \ldots, n_r
 $\nu/n_i \leq n_i \leq \cdots \leq n_r$, then the integers n_{i_i,\ldots,n_r}
are called the cycle type of σ .

Note
$$n_{1}, \dots, n_{r}$$
 give us a partition of n :
positive integers which sum to n_{r}
 $e.g.$ $\sigma = (1 2 3)(5 4) \in S_{4}$ has cycle type
 $= (4)(56)(123)$ $1, 2, 3$

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Prog Two effs of Sn are conjugate iff they have
the same cycle type.
PF
$$\Rightarrow$$
: $\sigma' = \tau \sigma \tau''$ then σ, σ' have same
cycle type by the previous prop.
 \Leftarrow : If σ_i, σ_i have the same cycle type,
write them in nondecreasing cycle length
order. Get 2 lists of $\pm s$ 1,..., n. Define
 τ (i-th integer listed for σ_i) = i-th integer
listed for σ_i
Then $\tau \in S_n$ is $\pm \sigma_i \tau'' = \sigma_2$.
 $\sigma_i = (4)(5 G)(1 2 3)$
 $\pm J J J J \tau$
 $\sigma_i = (\tau(4))(\tau(5) \tau(G))(\tau(1) \tau(2) \tau(3))$
 $= (3)(1 2)(4 G 5) = \sigma_2$

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*g: Representatives for conj classes in Sy
are in bij corr w/ partitions
$$34 \ 4$$

Partition of n=4)
 $1+1+1+1$
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 $f \circ f' = f' \circ f = i d_{G}$ e fige Aut (G), fog is hom & sijective.