Section 8.3

Some non-conceptual theorems

A collection of useful (non-conceptual) facts from a
Th 8.13 Let G be a group, and N CG be a normal subgra-
(a) If G is finite, then
$$|G/N| = |G|/N|$$
 i definite
(b) If G is abelian, then so is G/N
(da)(AB) = $A(aB) = A(Ba) = (AB)(Aa)$
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Tovery subgroup of an abelian group is normal.
Na = aN
Na = aN
Na = h na | n EN 5 = h an | n EN 5 = aN
Similarly, for any group G, its center
 $I(G) = h g \in G | ga = ag$ for every $a \in G$
is a normal sugroup in G.
Th 8.14 G/N is abelian iff $aba'b' \in N$ for any $a, b \in$
 Pf G/N is abelian means. Na N $b = N B$ N a for
Nab = N ba means that there exists neN such
 $ab = n ba equivalently, $ab(ba)' \in N$ (0)$

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that (ba) = a b'

Pf

$$C = Z(G)$$

 $G/c = \langle Cd \rangle$ Every coset is $(Cd)^{i} = Cd$
 $det a, b \in G$. $a = c_{1}d^{i}$ $b = c_{2}d^{i}$ with $c_{1}, c_{2}d^{i}$
 $ab = c_{1}d^{i}c_{2}d^{i} = c_{2}c_{1}d^{i+i} = c_{2}c_{1}d^{i}d^{i} = c_{2}d^{i}d^{i}d^{i}$



