# Homomorphisms and quotient groups

rctcwyvrn

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## 1 Homomorphisms and quotient groups

### 1.1 Generators and group presentations

We can imagine the subgroup generated by $x$ as x being thrown in a box with itself and shook around. So what if we throw in more elements to be shook together?

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**Definition:** Subsets as group generators

The subgroup generated by a subset S of G, $\langle S \rangle$, is the set of finite productive between elements of $S$ and their inverses.

- $S = [a, b]$, then $\langle S \rangle$ is stuff like $abababa$, $a^5b^3ab^2$, $a^{-1}bab^{-100}$

- If $\langle S \rangle = G$, then S is a **set of generators** for $G$

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**Example:** $\mathbb{Z}$

$\langle 1 \rangle = \mathbb{Z}$, because each integer can be written as a bunch of 1's or a bunch of $-1$'s

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Test to see if my compile scripts work