Examples of groups:
- $(\mathbb{Z},+)$, $(\mathbb{Q},+)$, $(\mathbb{R},+)$, $(\mathbb{C},+)$
- $(\mathbb{Q}^\times,\cdot)$, $(\mathbb{R}^\times,\cdot)$, $(\mathbb{R}^+,\cdot)$, $(\mathbb{C}^\times,\cdot)$, $(S^1,\cdot)$, $(\mathbb{H}^\times,\cdot)$

If T is a set and $(G,*)$ is a group then the set G^T of all functions $f:T\to G$ forms a group under the operation $(f\bullet g)(t)=f(t)*g(t)$.
The set $C([0,1])$ of continuous functions $f:[0,1]\to\mathbb{R}$ forms a subgroup of the group of all functions $f:[0,1]\to\mathbb{R}$.

A function $f:X\to Y$ is:
- injective if $f(x)=f(y)$ implies $x=y$
- surjective if for every $y\in Y$ there exists $x\in X$ such that $f(x)=y$
- bijective if it is injective and surjective

Inverse of a function $f:X\to Y$ is a function $g:Y\to X$ such that $(g\circ f)(x)=x$ for every $x\in X$ and $(f\circ g)(y)=y$ for every $y\in Y$. A function $f:X\to Y$ has an inverse if and only if it is bijective.

If X is a set, then the set $S_x=\{f:X\to X : f \text{ is a bijection}\}$ is a group under the operation of composition of functions. This is the symmetry group of the set X. If $X=\{1,2,\dots,n\}$ then we use the notation S_n for S_x.

Examples of homomorphisms:
- evaluation homomorphism $\delta_t:G^T\to G$ which operates $\delta_t(f):=f(t)$
- integration homomorphism $I:C([0,1])\to\mathbb{R}$ which operates $I(f):=\int f(t)dt$
- multiplication $\varphi_r:\mathbb{Z}\to\mathbb{Z}$ for fixed $r\in\mathbb{Z}$ which operates $\varphi_r(x):=rx$