No 1. Open & Closed mappings. Examples:

ⓐ $A \subseteq X$ inclusion is open/closed iff A is open/closed

ⓑ For a continuous bijection to be a homeomorphism, it is necessary & sufficient that it be open/closed.

ⓒ Let $X \xrightarrow[f]{\text{set}} X'$ top space be a surjective map. Suppose X is given the initial topology w.r.t. f. Then f is continuous, open, & closed.

ⓓ The inverse of a continuous bijection is open/closed but not necessarily continuous.

ⓔ $\prod X_i \to X_i$ projections are open but not always closed.

ⓕ $A^{\text{open}} \subseteq \mathbb{C}$. f: (non-constant) holomorphic fn on A. Then f is open.

ⓖ Open mapping theorem (in functional analysis) f continuous linear map $: X \to Y$, f surjective, X & Y Banach. Then f is open.

Propn: $X \xrightarrow{f} X' \xrightarrow{g} X''$
ⓐ g & f open/closed $\Rightarrow$ $g \circ f$ open/closed
ⓑ $g \circ f$ is open/closed, f is continuous & surjective $\Rightarrow$ g is open/closed
ⓒ $g \circ f$ is open/closed, g is continuous & injective $\Rightarrow$ f is open/closed

Propn: $X \xrightarrow{f} Y$. For $T \subseteq Y$, $f_T : f^{-1}(T) \xrightarrow{f} T$. (definition of f_T)
ⓐ f is open/closed $\Rightarrow$ f_T is open/closed.
ⓑ If $\{T_i\}_{i \in I}$ is a family of subsets of Y s/t their interiors cover Y or which form a LF closed cover of Y, then if f_{T_i} is open/closed $\forall i$ then f is ~~clo~~ open/closed.

CoR: Let $\{T_i\}$ be a family of subsets of Y s/t either ⓐ the interiors of the T_i cover Y or ⓑ the $\{T_i\}$ form a LF closed cover of Y. Then if $X \to Y$ is continuous map s/t $f_{T_i}: f^{-1}(T_i) \to T_i$ is a homeo for all $i \in I$, then $X \to Y$ is a homeomorphism.