Uncountable sets

A set X is uncountable if X is infinite but $|X| \neq |\mathbb{N}|$.
Examples:

- $[0, 1]$
- $\mathbb{R}$
- $\mathbb{P}(\mathbb{N})$
- The set of functions from $\mathbb{N}$ to $\{0, 1\}$
- The set of all infinite length binary strings

Furthermore, for any set A that is listed above, then

- Any set X that contains A as a subset is uncountable
- Any set X that contains a subset Y where $|Y| = |A|$ is uncountable