❖ Power Set:

➔ Given the set **S = {0, 1}**. What are all the possible subsets of S? They are: ∅ (as it is a subset of all sets), {0}, {1}, and {0, 1}.

➔ The power set of **S** written as **P(S)** is the set of all the subsets of **S**
P(S) = {∅, {0}, {1}, {0,1}}.

- Note that **|S| = 2** and **|P(S)| = 4.**

➔ The ***power set*** **P(*S*)** of a set ***S*** is the set of all subsets of ***S*.**
P(*S*) = {*x* | *x* ⊆ *S*}.

➔ *E.g.* P({a, b}) = {∅, {a}, {b}, {a, b}}.

➔ Sometimes P(*S*) is written $\mathbf{2}^{S}$.

- Note that for finite ***S***, $|P(S)| = 2^{|S|}$.

➔ It turns out that **|P(N)| > |N|.**
There are different sizes of infinite sets!

➔ Let T = {0, 1, 2}. The P(T) = {∅, {0}, {1}, {2}, {0,1}, {0,2}, {1,2}, {0,1,2}}.

- Note that |T| = 3 and |P(T)| = 8

➔ P(∅) = { ∅ }

- Note that |∅| = 0 and |P(∅)| = 1

➔ If a set has ***n*** elements, then the power set will have $\mathbf{2}^{n}$ elements.