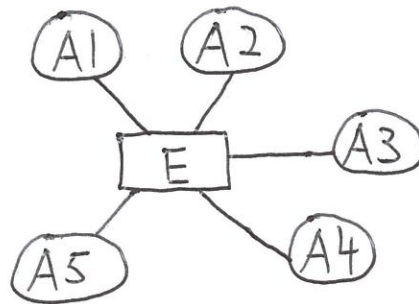$$C_r^n = \frac{n!}{(n-r)!\,r!}$$

no. of combinations of choosing r out of n items/things

$$\begin{cases} m! = m \cdot (m-1) \cdots 2 \cdot 1 \\ 0! = 1 \end{cases}$$

e.g., $3! = 3 \cdot 2 \cdot 1 = 6$

'!' pronounces factorial

- -

Assumption:

A1 or A2 can uniquely identify a record/row/instance

How many super keys?

1 - attribute : $C_1^2 = \frac{2!}{(2-1)!\,1!} = \frac{2 \cdot 1}{1 \cdot 1} = 2$ A1, A2
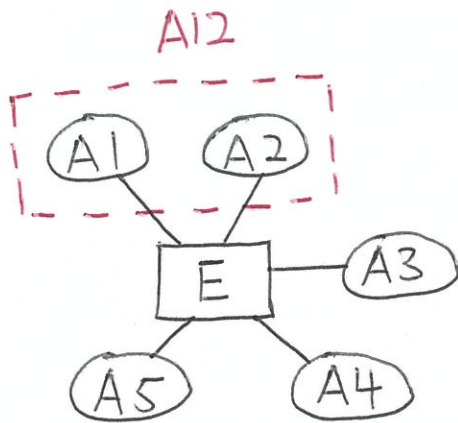
2 - attribute : $C_1^2 C_1^3 + C_2^2 = 2 \cdot 3 + 1 = 7$

$\{A1, A3\}$, $\{A1, A4\}$, $\{A1, A5\}$
$\{A2, A3\}$, $\{A2, A4\}$, $\{A2, A5\}$, $\{A1, A2\}$

3 - attribute : $C_1^2 C_2^3 + C_2^2 C_1^3 = 2 \cdot 3 + 1 \cdot 3 = 9$

4 - attribute : $C_1^2 C_3^3 + C_2^2 C_2^3 = 2 \cdot 1 + 1 \cdot 3 = 5$

5 - attribute : $C_5^5 = \frac{5!}{(5-5)!\,5!} = \frac{5!}{0!\,5!} = 1$

$\therefore$ In total, $2 + 7 + 9 + 5 + 1 = 24$

A12

Assumption:

Each record / row / instance can be uniquely identified by A1 & A2.

How many superkeys?

1 - attribute : 0

← A12

2 - attribute : $C_1^1 = 1$ {A1, A2}

3 - attribute : $C_1^1 C_1^3 = 1 \cdot 3 = 3$

{A1, A2, A3}, {A1, A2, A4}

{A1, A2, A5}

4 - attribute : $C_1^1 C_2^3 = 1 \cdot 3 = 3$

{A1, A2, A3, A4}, {A1, A2, A3, A5}

{A1, A2, A4, A5}

5 - attribute : $C_1^1 C_3^3 = 1 \cdot 1 = 1$

{A1, A2, A3, A4, A5}

∴ In total, $1 + 3 + 3 + 1 = 8$