with $|S| = k$ requires $k-1$ comparisons.

The number of distinct sets $S$ of some $k$ (i.e. $|S|$) not including 1 and $i$ is ${}^{n-2}C_k$ $\binom{n-2}{k}$ (combination)

where

$n$ is number of cities

$${}^{n}C_{r} \Rightarrow \frac{n!}{(n-r)!\, r!}$$

$$^{n-2}C_k \Rightarrow {}^{4-2}C_3 \Rightarrow 0$$

$$\Rightarrow {}^{2}C_{\underline{2}} \Rightarrow \underline{1}$$

$$\Rightarrow {}^{2}C_1 \Rightarrow 2$$

$$\Rightarrow {}^{2}C_0 \Rightarrow 0$$

Let N be the number of $g(i, S)$ that have to be computed before formula ① / ② can be used to compute

$$g(1, V-\{1\})$$

$$\Rightarrow \sum_{k=0}^{n-2} (n-k-1)\binom{n-2}{k} \quad \text{Choose}$$

$$= (n-1) \cdot 2^{n-2}$$

For each value of $|S|$ there are $(n-1)$ choices for $i$.

---

One problem space is solved with subset

$$(n-1)\,2^{n-2}$$

And such $(n-1)$ times linearly we solve

$$(n-1)^2\,2^{n-2} \rightarrow \underline{\Theta(n^2 2^n)}$$

About crossover point
for value $n = 8$

$n! \quad > \quad 2^n \cdot n^2$

$n = 17$

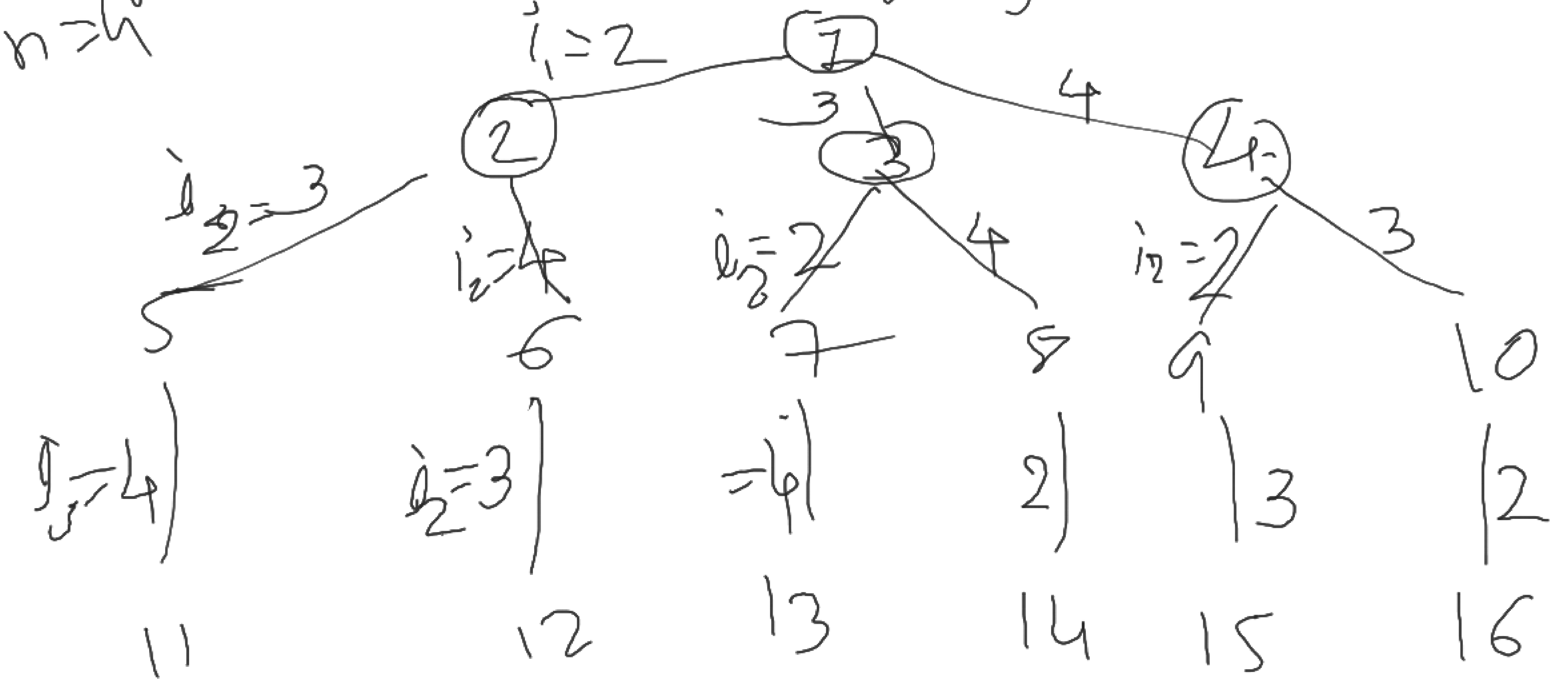
$n!$ 355,687,428,096,000

355 T

37,879,808

37M

Branch & Bound works better than DP provided bounding $f^n$ smartful.




partial state space

Graph Analysis Algo

1 Hamiltonian Cycle Algo analysis

$$\Theta(\underbrace{V}_{\text{Number of vertices}} + \underbrace{E}_{\text{Number of edges}})$$

many complex algorithms
analytical (math)
analysis is not straightforward
So, empirically / practically
(literally write program and
run on various data sets)
performances are measured to
learn about relative running times
of algorithms.