

ER2024

①
$$\left. \begin{array}{l} n > 0 \\ 0 < k \leq n \end{array} \right\} P(n, k) = P(n-1, k-1) + P(n-1, k)$$

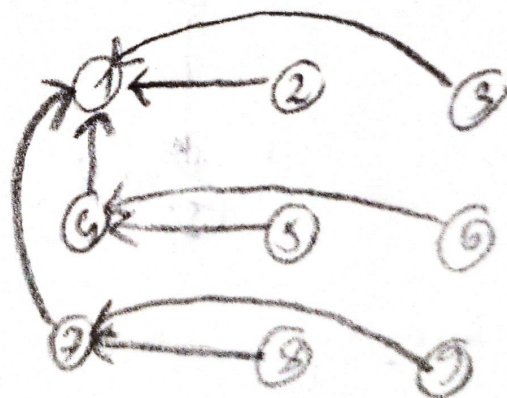
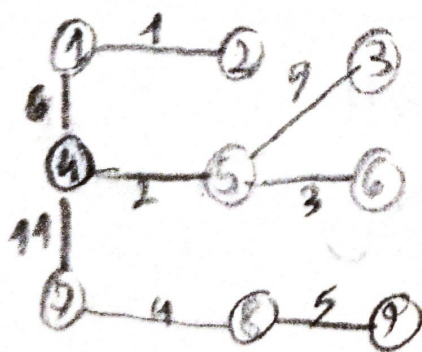
function $P(n, k)$
 if $(n=1 \text{ or } k=1 \text{ or } k=n)$
 return 1

for cur in $1, \dots, n$:
 return $(P(n-1, k-1) + P(n-1, k))$

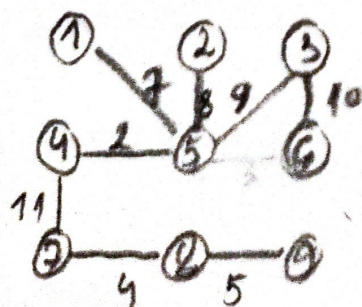
function main(n):

for i in $1, \dots, n$:
 for j in $1, \dots, i$:
 print($P(i, j)$)
 print("\n")

② a



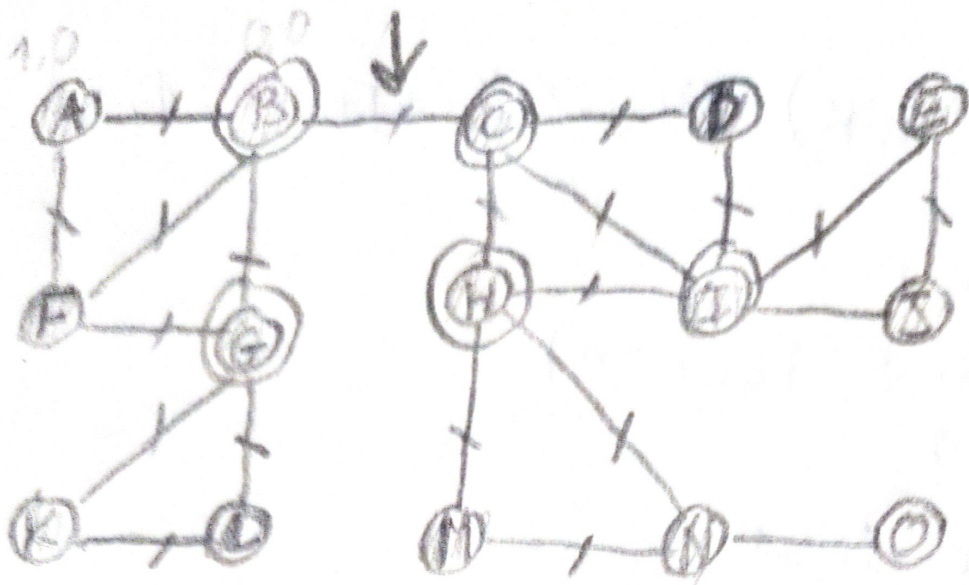
b



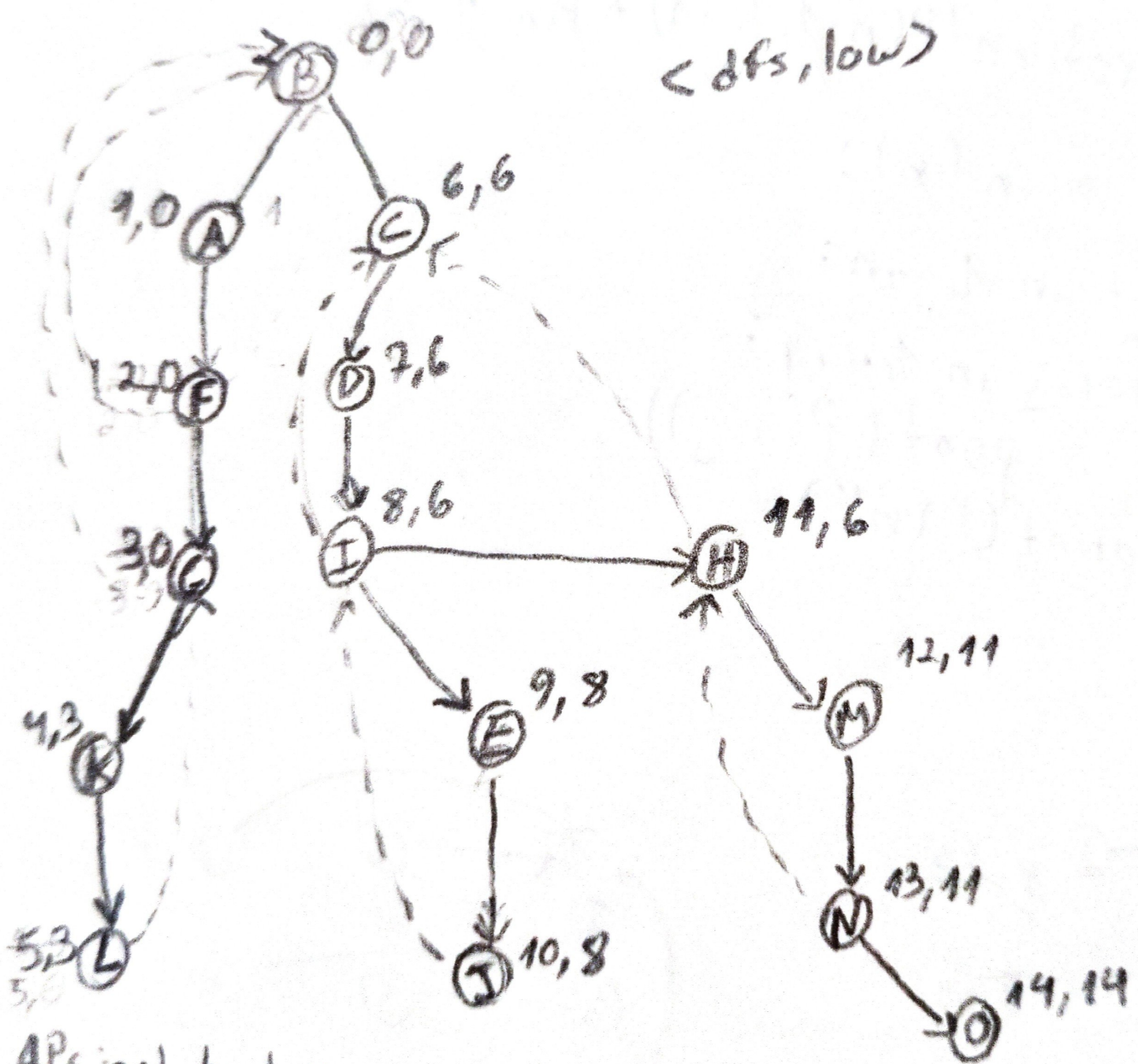
	1	2	3	4	5	6	7	8	9
d =	∞	∞	0	∞	∞	∞	∞	∞	∞
	16	17		11	9	10	22	26	31

5 6 4 1 2 7 8 9

③



(dfs, low)



APs and bridges $\langle N, O \rangle$

G, H, I, C, B, $\langle B, C \rangle$

④

function $D(n, m, d)$:

for idx in $0, \dots, n$:

$dp[idx][0] = \infty$

for idx in $0, \dots, m$:

$dp[0][idx] = \infty, d$:

for i in $1, \dots, n$:

$dp[i]$

for j in $1, \dots, m$:

$dp[i, j] = 0, m1, m2, m3 = \infty$

if $i-1 > 1$

$m1 = dp[i-1, j]$

if $j-1 > 1$

$m2 = dp[i, j-1]$

if $(j-1 > 1) \text{ and } (i-1 > 1)$:

$m3 = dp[i-1, j-1]$

$dp[i, j] = d[i] + \min(m1, m2, m3)$

return $dp[n, m]$

Temporal: $O(n^2)$

Espacial: $O(n^2)$

call $D(n, n, d)$