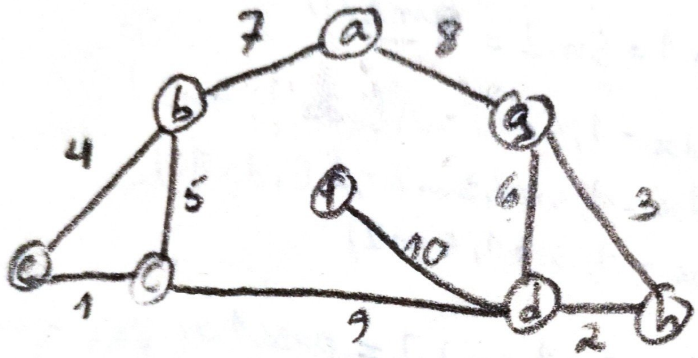
EN 2019

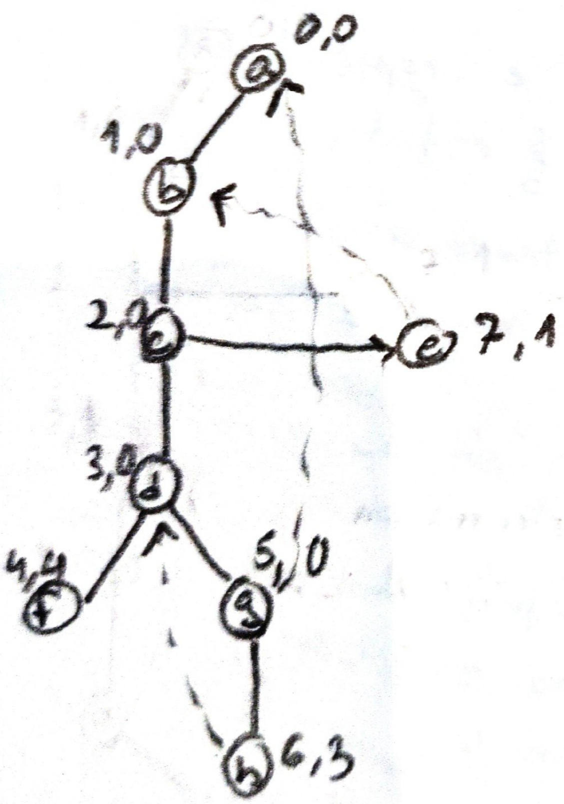
① $T(n) = \begin{cases} T(\frac{n}{2})+1, & n>1 \\ 1, & n=1 \end{cases} \Rightarrow T(n) = \Theta(\log n)$

$a=1$
$b=2$
$c=0$

$\log_b a = \log_2 1 = 0 = c$

② ⓐ

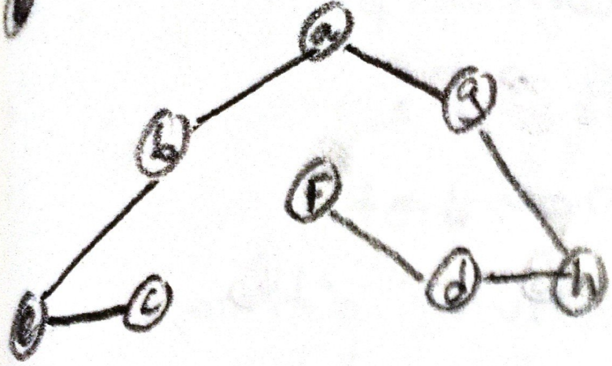


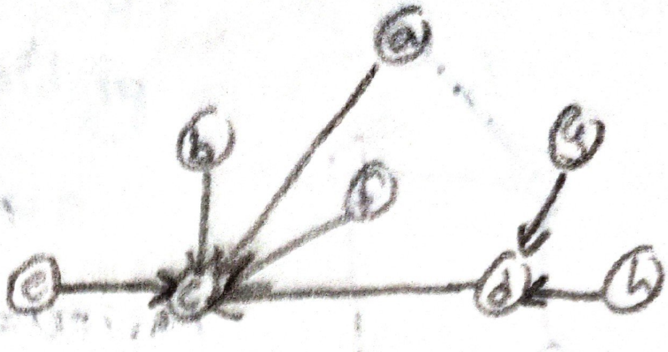


$AP_s = \{d\}$

$low[f] \geq dfs[d]$

1





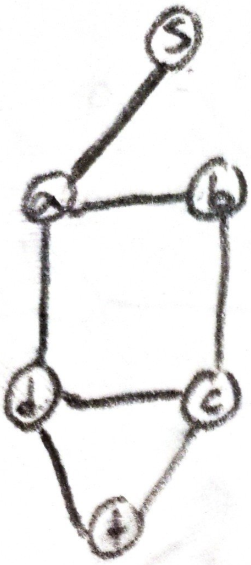
3

a

```
vis = [false for every index 0...|V|]
function f(cur, vis, t, G):
    if cur = t:
        return 0
    vis[cur] = True
    mx_from_cur = -∞
    for each {cur, w} ∈ E:
        if vis[w] = False
            from_w = f(w, vis, t, G)
        if from_w ≠ -∞ :
            mx_from_cur = max(max_from_cur,
                              1 + from_w)
    vis[cur] = False
    return max_from_cur
```

$O(|V|!)$, aproximadamente, dado que estamos a permutar a ordem de escolha dos vertices

(b)



Resposta correta p/ problema $s \to t$:

$s \to a \to b \to c \to d \to t$

Assumindo substrutura ótima, a resposta ao sub-problema $b \to t$ é $b \to c \to d \to t$, com comprimento = 3, no entanto, a resposta real a esse subproblema é $b \to a \to d \to c \to t$, com comprimento = 4

(4)

(a)

```
function M(i, j):                    call M(1,n)
    if dp[i,j] is cached
        return dp[i,j]
    if i = j:
        return 0

    mn = +∞
    for K in i,...,j-1:
        mn = min(mn, M(i,K) + M(K+1, j) + p[i,K,j])
    return dp[i,j] = mn.
```

(b)

```
for i in 0...n:
    dp[i, i] = 0 }← Redundante

for i in 0...n:
    for j in 0..n:
        if i=j: dp[i,j]
        dp[i,j] = ∞
        for K in i,...,j-1:
            dp[i,j] = min(dp[i,j], dp[i,K] + dp[K+1,j] + p[i,K,j])

return dp[1,n]
```