

Esercitazione 23-04-2020 parte 2

Word count: 278

Esercizio 1

controesempio:

$$\begin{array}{l} (37) \\ / \quad \backslash \\ (22) \quad (31) \\ / \\ (25) \\ x=25 \quad y=22 \quad h(x)=2 \quad h(y)=1 \end{array}$$

Esercizio 2

L'algoritmo calcola $B=[b_1, \dots, b_n]$ tale che $b_i = \sum_{j=1}^i a_j$, praticamente somme prefisse.

```
for i=1 to n do           n-volte
    B[i]=0                c1
B[1]=A[1]                 c2
for i=2 to n do          n-volte
    for j=1 to i do      i-volte
        B[i]=B[i]+A[j]   c3
for i =1 to n do         n-volte
    stampa B[i]           c4
```

$$\begin{aligned} T(n) &= c14 * n + c2 + c3 \sum_{i=2..n} [i] = \\ &= c14 n + c2 + c3 (n*(n+1)/2 - 1) = c3/2 n^2 + \dots = \Theta(n^2) \end{aligned}$$

Punto b.

Per eseguire somme prefisse in $\Theta(n)$ copio A su B e calcolo le somme scorrendo una sola volta B.

```
fun prefixSun(A, n) {
    B = clone(A)           \Theta(n)
    for i=2..n             n-volte
        B[i] = B[i] + B[i-1]   c1
}
```

$$T(n) = \Theta(n) + c1 n = \Theta(n)$$

Esercizio 3

A = [2, 5, 8, 8, 8, 8, 29]

binSearch(A, 8, 0, 6) torna indice 3

```
fun binSearchFirst(A, k, i, f) {
    if (f < i) return -1

    m = (i+f)/2
    if (A[m] === k && (m === 0 || A[m-1] !== k))
        return k
    else (A[m] < k)
        return binSearchFirst(A, k, m+1, f)
    else
        return binSearchFirst(A, k, i, m-1)
}
```

```
fun binSearchLast(A, k, i, f) {
    if (f < i) return -1

    m = (i+f)/2
    if (A[m] === k && (m === len(A) || A[m+1] !== k))
        return k
    else (A[m] <= k)
        return binSearchLast(A, k, m+1, f)
    else
        return binSearchLast(A, k, i, m-1)
}
```

```
fun ex3(A, n, k) {
    f = binSearchFirst(A, k, 0, n-1)
    l = binSearchLast(A, k, 0, n-1)
    return (f, l)
}
```

