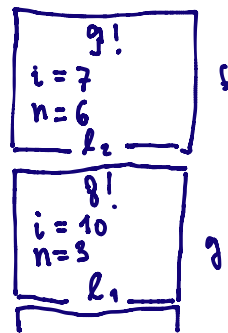


```
def f(n):
    i = 1 + n
    return i + 2
```

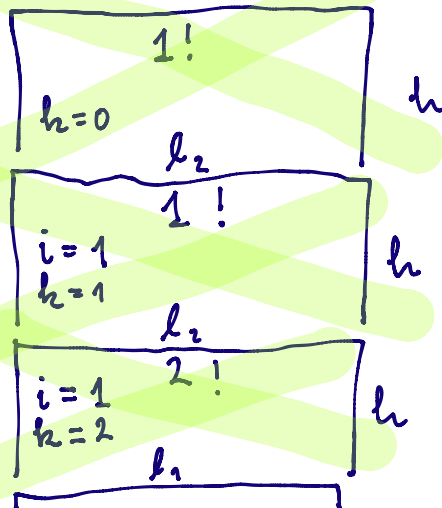
```
def g(n):
    i = 1 + f(n + 3) l2
    return i - 2
```

```
>>> g(3) l1
8
```

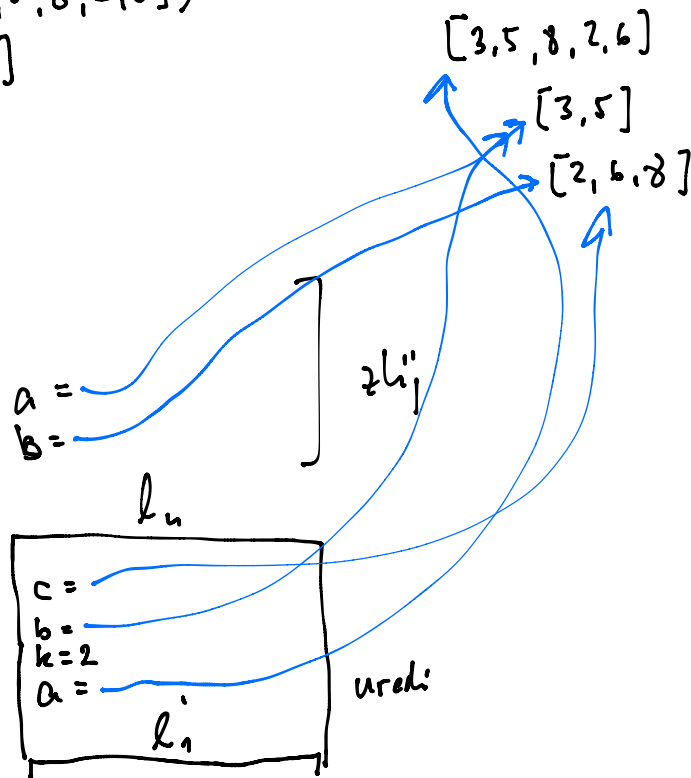


```
def h(k):
    if k == 0: return 1
    else:
        i = h(k - 1) l2
        return k * i
```

```
>>> h(2) l1
2
```



```
>>> uradi([3,5,8,2,6])
[2,3,5,6,8]
```



Časovna zahtevnost učenja z
življenjem

$T(n)$ = št. korakov za urejanje
tabele dolžine n

$$T(0) = 1$$

$$T(1) = 1$$

$$T(n) = T(n/2) + T(n/2) + n$$

$$\begin{aligned}
T(n) &= n + 2 \cdot T(n/2) \\
&= n + 2 \cdot \left(\frac{n}{2} + 2 \cdot T\left(\frac{n}{4}\right) \right) \\
&= n + n + 4 \cdot T\left(\frac{n}{4}\right) \\
&= n + n + 4 \cdot \left(\frac{n}{4} + 2 \cdot T\left(\frac{n}{8}\right) \right) \\
&= n + n + n + 8 \cdot T\left(\frac{n}{8}\right) \\
&\vdots \\
&= \underbrace{n + n + \dots + n}_k + 2^k \cdot T\left(\frac{n}{2^k}\right)
\end{aligned}$$

$$= (n \cdot \log_2 n) + 2^{\log_2 n} \cdot T(1)$$

$$= (n \cdot \log_2 n) + n \cdot 1 = n + n \cdot \log_2 n$$

$$= O(n \cdot \log_2 n)$$

$$T(n) = n + 3 \cdot T\left(\frac{n}{3}\right) \rightsquigarrow n \cdot \log n$$

$$T(n) = n + 3 \cdot T\left(\frac{n}{4}\right) \rightsquigarrow ?$$

$$\parallel$$

$$n + 3 \cdot T\left(\frac{n}{4}\right) =$$

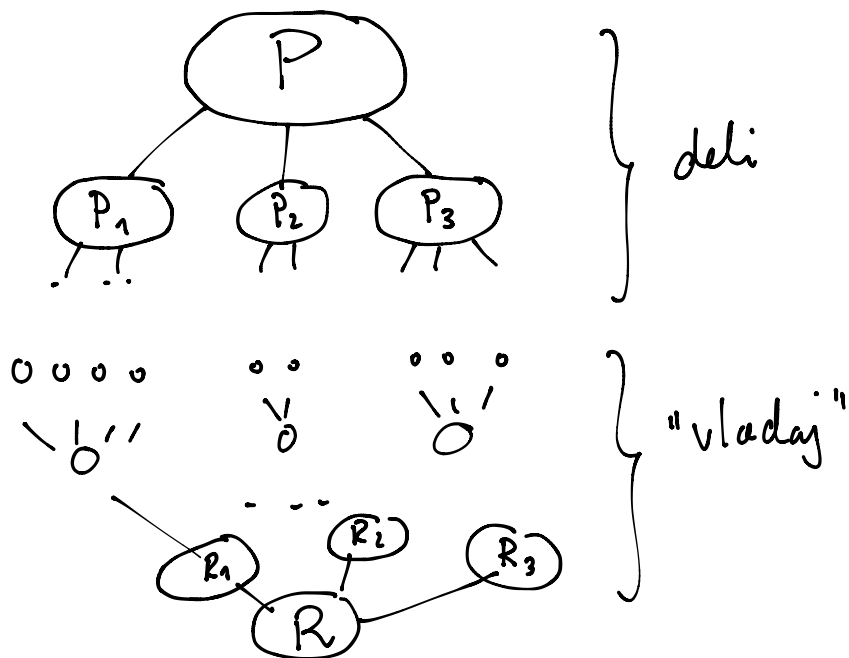
$$n + 3 \cdot \left(\frac{n}{4} + 3 \cdot T\left(\frac{n}{16}\right) \right) =$$

$$\begin{aligned}
&\parallel 1? \\
&\frac{n}{2^k} = 1 \\
&k = \log_2 n
\end{aligned}$$

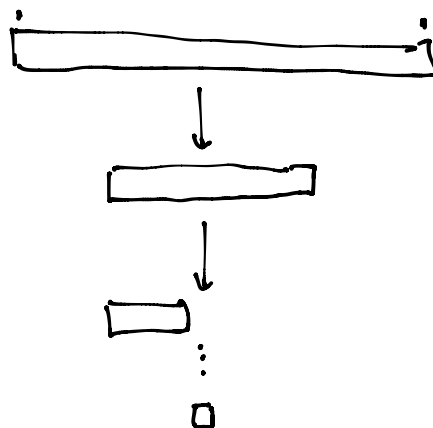
$$\begin{aligned}
 n + \frac{3}{4}n + 3^2 \cdot T\left(\frac{n}{4^2}\right) &= \\
 n + \frac{3}{4}n + \frac{3^2}{4^2}n + 3^3 T\left(\frac{n}{4^3}\right) &= \\
 n \cdot \left(1 + \frac{3}{4} + \left(\frac{3}{4}\right)^2 + \dots + \left(\frac{3}{4}\right)^k\right) + 3^{k+1} T\left(\frac{n}{4^{k+1}}\right)
 \end{aligned}$$

$$\begin{aligned}
 &\leq n \cdot c + 3^{\log_4 n} \cdot 1 \\
 &\leq c \cdot n + n^{\log_4 3} \\
 &O(n)
 \end{aligned}$$

DELI in VLADAJ

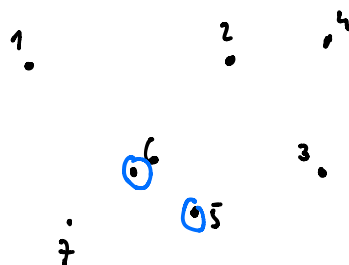


Primeri: urejanje z zlivanjem
bisekcija



Najbližji par točk

Naloga: imamo točke $T_1, \dots, T_n$ v ravnini.
Poišči par najbližjih točk (T_i, T_j) .

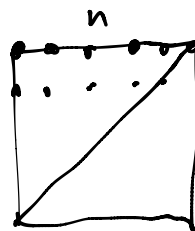


Preprosta rešitev:

obravnavamo vse pare (T_i, T_j) , $i < j$

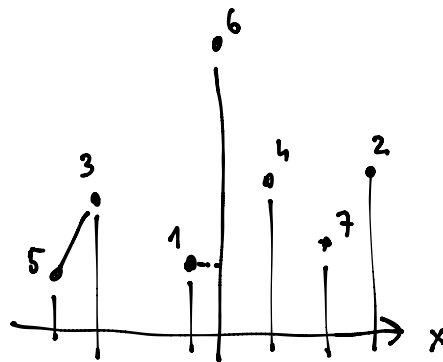
število parov: $\cancel{n^2} - n$
 $\frac{n^2 - n}{2}$

$O(n^2)$

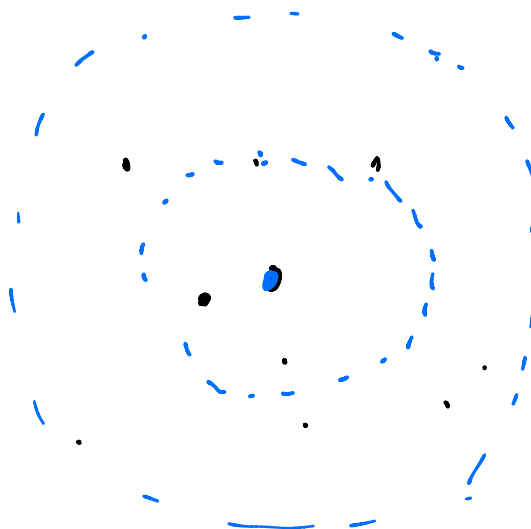


Izboljšamo:

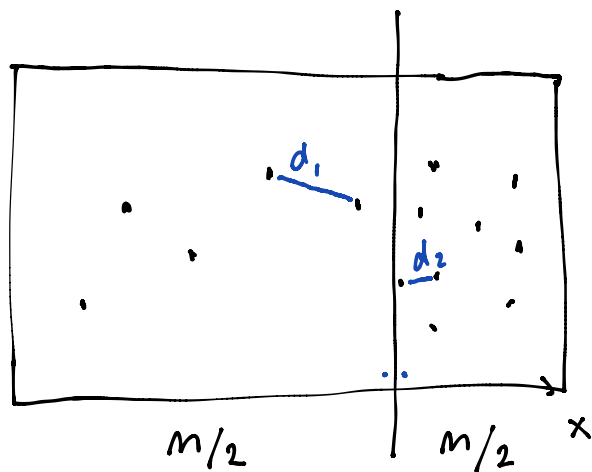
Ideja: "SORTIRANO"



Ideja: "BISEKCIJA"

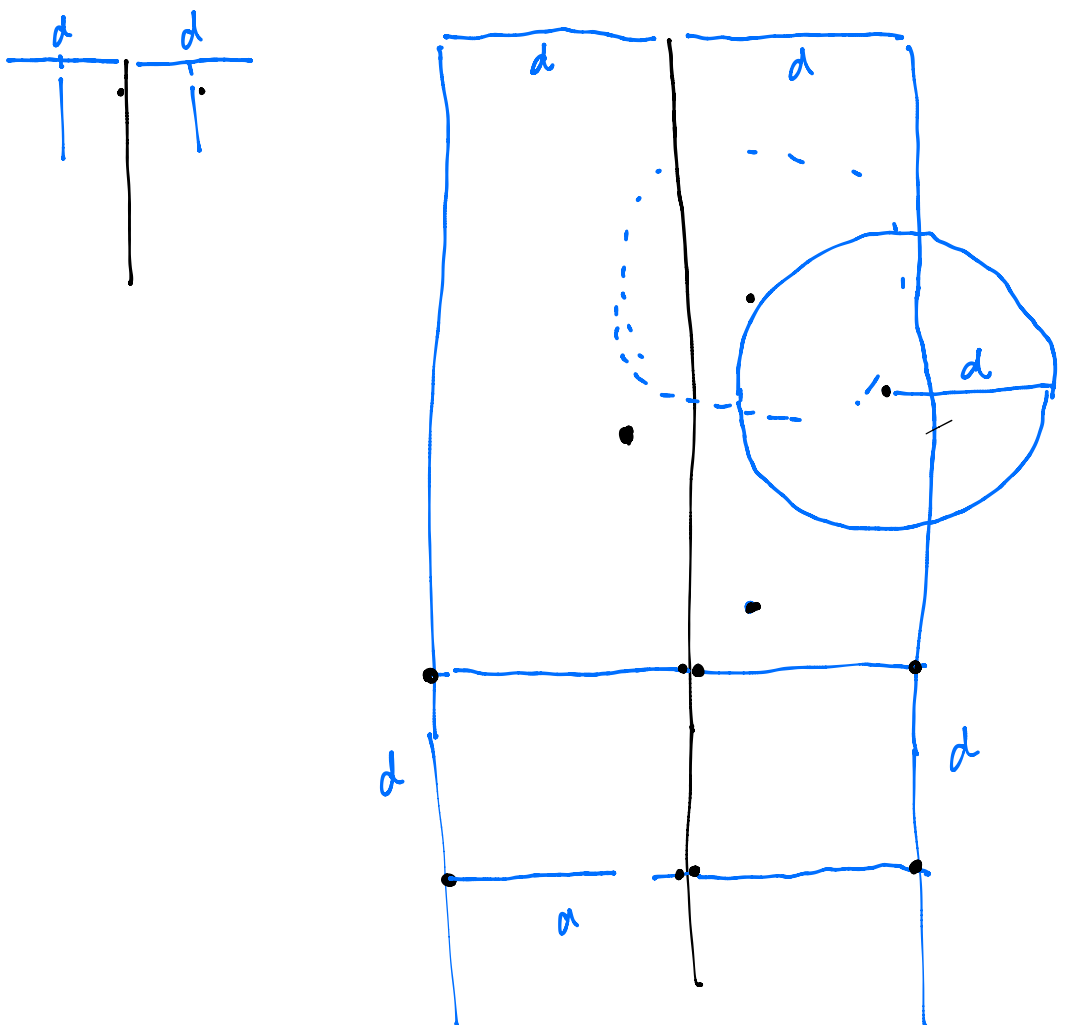


$$T(n) = 2 \cdot T\left(\frac{n}{2}\right) + \underbrace{\quad}$$



$$d = \min(d_1, d_2)$$

zlivanje: opazujemo območje vohi
delilne črte širine $2d$



najbližji par $(T_1, \dots, T_n)$:

if $n \leq 2$:

Osnovni primer

$(S, S', d_1) = \text{najbližji par}(T_1, \dots, T_{n/2})$

$(R, R', d_2) = \text{najbližji par}(T_{n/2+1}, \dots, T_n)$

$d = \min(d_1, d_2)$

Obravnavaj pas širine d okoli
razmisljivane črte

Case 2: $T(n) = 2 \cdot T\left(\frac{n}{2}\right) + n$

$$O(n \cdot \log n)$$