```
x = A[r];
i = p - 1;
for j = p to r - 1 do
    if A[j] ≤ x then
        i = i + 1;
        exchange A[i] com A[j];
    end
end
exchange A[i + 1] with A[r];
return i + 1;
```

$\boxed{n = r - p + 1}$

Algorithm 9: *partition*(A, p, r)

$$T_p(n) = \sum_{j=1}^{n-1} 1 = n - 1 = \Theta(n).$$

$$T_w(n) = T_w(n-1) + \cancel{T_w(0)}^{\,0} + \Theta(n)$$
$$= T_w(n-1) + \Theta(n)$$

$$T_w(n) = \underline{T_w(n-1)} + c \cdot n \quad (c > 0).$$
$$= \underline{\underline{T_w(n-2)} + c.(n-1)} + c.n$$
$$= \underline{T_w(n-3) + c.(n-2)} + c(n-1) + c.n$$
$$= \ldots = T_w(n-n) + c.1 + c.2 + \cdots + c.(n-1) + c.n$$
$$= c \cdot \sum_{i=1}^{n} i = c\,\frac{n(n+1)}{2}. \Rightarrow \text{Af. } \boxed{T_w(n) = \frac{c}{2} n(n+1)}$$

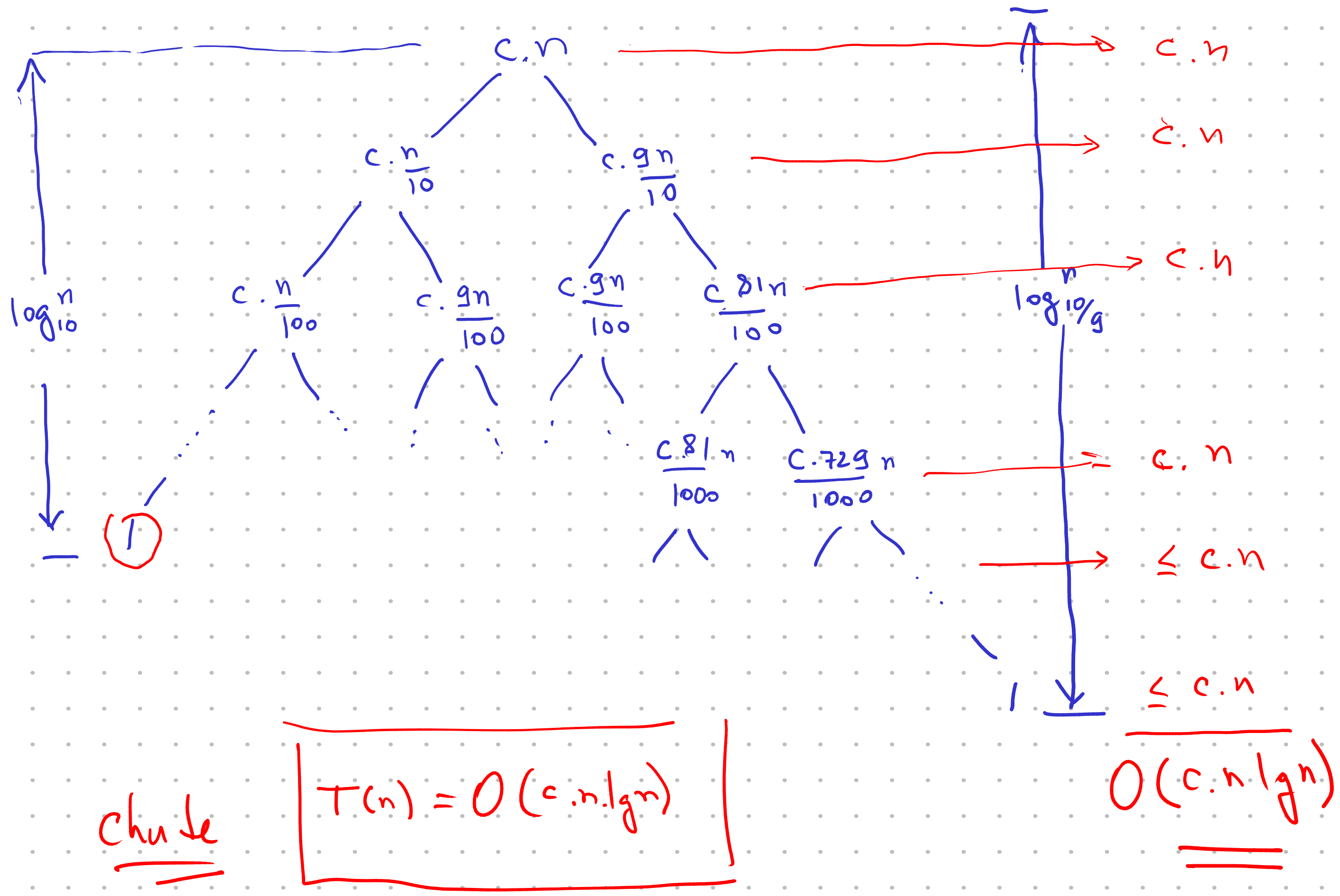
Verificação por indução:

$$\text{PO} \quad \frac{\overbrace{\forall k (P_k \rightarrow P(k+1))}}{\forall n, P_n}$$

$$T_w(k+1) = \underline{T_w(k)} + c.(k+1).$$
$$\overset{h.i.}{=} \underline{\frac{c}{2} k(k+1)} + c.(k+1)$$
$$= \frac{c.k(k+1) + c.2(k+1)}{2}$$
$$= \frac{c}{2} \cdot (k+1) \cdot (k+2) \quad \blacksquare$$

$$\Rightarrow T_w(n) = \Theta(n^2)$$

$$T(n) = T\left(\frac{9n}{10}\right) + T\left(\frac{n}{10}\right) + c.n \quad (c>0).$$



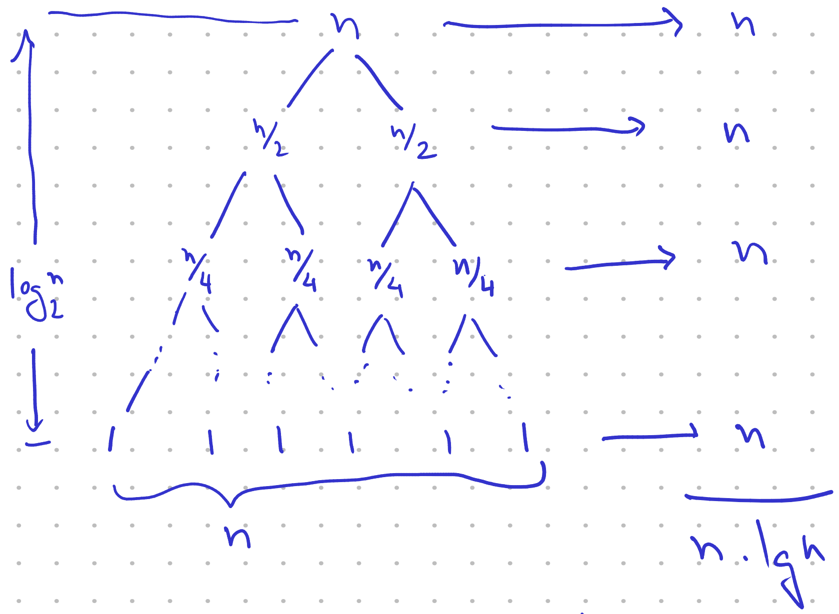
Chute

$$\boxed{T(n) = O(c.n.\lg n)}$$

$\Rightarrow$ Indução p/ verificar.

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

$n = 2^k$



$$\Rightarrow T(n) = \Theta(n.\lg n).$$