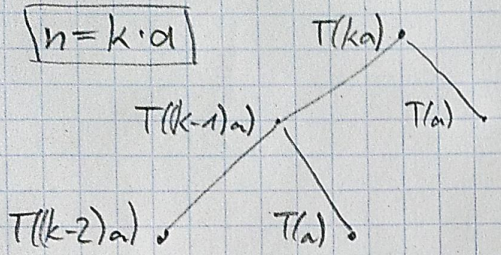
DGA Ü3

2.) $T(n) = \begin{cases} T(n-a)+T(a)+n & , n>a \\ 0 & , n<a \\ c & , n=a \end{cases}$

ges: asymptotische obere Schranke

$\boxed{n = k \cdot a}$



ka

$(k-1)a+c$

$(k-2)a+c$

$(k-k)a+c = c$

$$\Rightarrow \sum_{j=0}^{k-1}((k-j)a+c) = k\cdot c + a\cdot\sum_{j=0}^{k-1}(k-j) = k\cdot c + a\sum_{j=1}^{k} j$$

$$= kc + a\,\frac{1}{2}(k+1)k = \frac{n}{a}c + a\,\frac{1}{2}\left(\frac{n}{a}+1\right)\frac{n}{a} = \frac{n}{a}c + a\,\frac{1}{2}\,\frac{n^2}{a^2} + a\,\frac{1}{2}\,\frac{n}{a}$$

$$\Rightarrow O\left(\frac{n^2}{a} + \frac{n}{a} + n\right) \quad \text{oder} \quad O(n^2+n)$$

$$T(n) = T(n-a)+T(a)+n = O\left(\frac{(n-a)^2}{a} + \frac{n-a}{a} + n - a\right) + c + n$$

$$= O\left(\frac{n^2 - 2an + a^2 + n - a + an - a^2 + ac + a}{a}\right) = O\left(\frac{n^2+n-a+ac}{a}\right)$$

$$= O\left(\frac{n^2}{a} + \frac{n}{a} - 1 + c\right) = O\left(\frac{n^2}{a} + \frac{n}{a} + n\right)$$

$$T(n) = T(n-a)+T(a)+n = (n-a)^2 + n - a + c + n = n^2 - 2an + a^2 + 2n - a + c$$

$$= n^2 + n(2-2a) + a^2 - a + c = O(n^2+n)$$