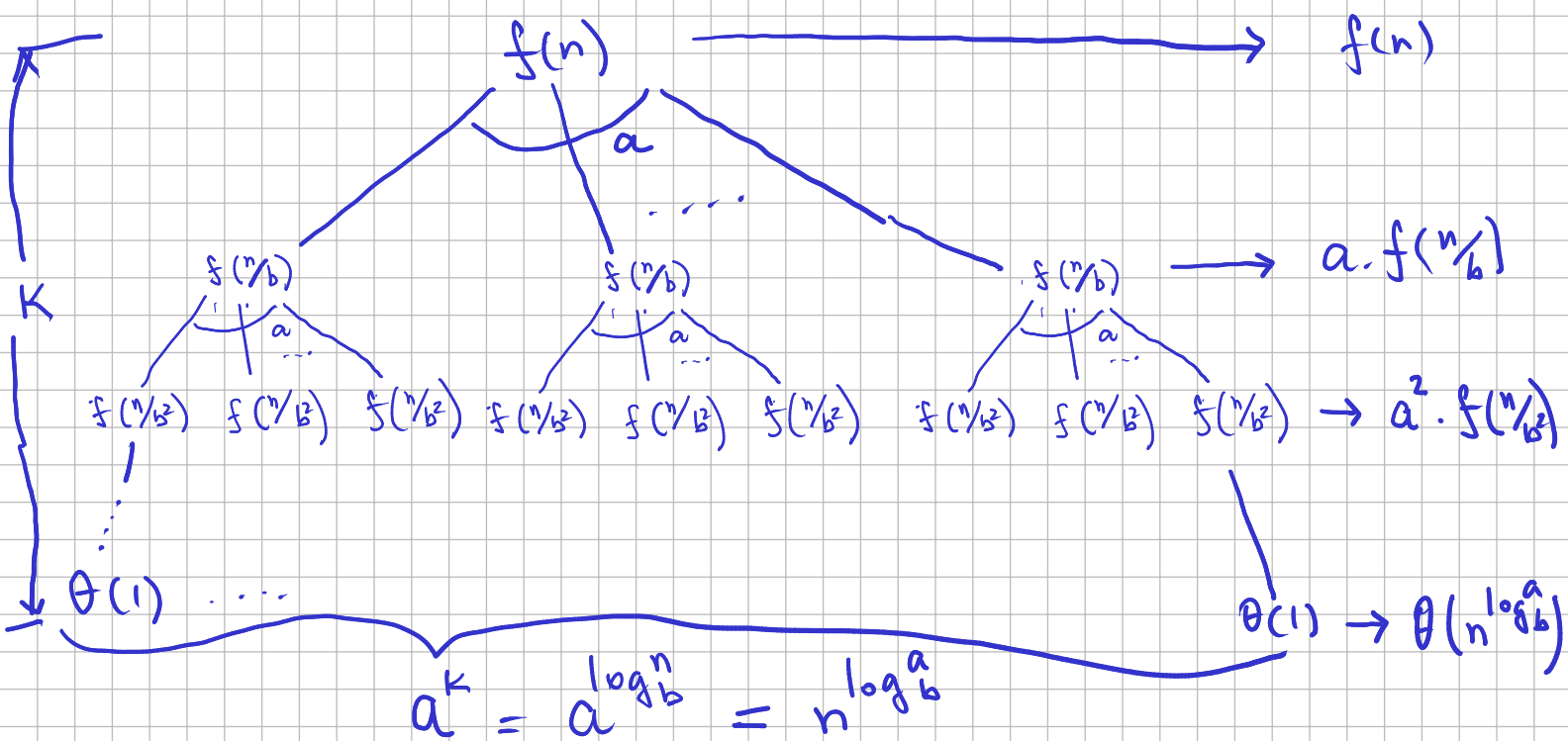


$$\begin{cases} T(n) = \underline{a \cdot T(n/b)} + f(n) & a \geq 1, b \geq 2 \\ T(1) = \Theta(1) \end{cases}$$

Assumiremos que  $n = b^k$  ( $k > 0$ )  $\Leftrightarrow k = \log_b^n$ .



$$T(n) = \Theta(n^{\log_b a}) + \sum_{j=0}^{\log_b^n - 1} a^j \cdot f(n/b^j)$$

---


$$T(n) = a \cdot \underline{T(n/b)} \quad (n = b^k)$$

$$= a \cdot (a \cdot T(n/b^2))$$

$$= a^2 \cdot \underline{T(n/b^2)}$$

$$= a^2 \cdot (a \cdot T(n/b^3))$$

$$= a^3 \cdot T(n/b^3)$$

$$= \dots$$

$$= a^k \cdot T(1)$$

$$\begin{aligned}
 &= a^{\log_b^n} \cdot T(1) \\
 &= n^{\log_b a} \cdot T(1) \\
 &= \theta(n^{\log_b a}) \\
 &=
 \end{aligned}$$


---

$$T(n) = 9 \cdot T(n/3) + n$$

$$f(n) = n = O(n^{\log_{3/3} 9}) = O(n^{2-2})$$

$$\text{CASO 1} \Rightarrow T(n) = \theta(n^2).$$


---

$$T(n) = T(2n/3) + 1 \quad (b = 3/2 > 1).$$

$$f(n) = 1 = \theta(n^{\log_{3/2} 1}) = \theta(n^0) = \theta(1)$$

$$\text{CASO 2} \Rightarrow T(n) = \theta(n^0 \cdot \lg n) = \theta(\lg n).$$


---

$$T(n) = 3 \cdot T(n/4) + n \cdot \lg n$$

$$f(n) = n \cdot \lg n = \Omega(n^{\log_4 3 + \epsilon})$$

CASO 3:

$$3 \cdot \frac{n}{4} \cdot \lg \frac{n}{4} \leq \frac{3}{4} \cdot n \cdot \lg n \quad (c < 1) \quad \checkmark$$

$$T(n) = \theta(n \cdot \lg n).$$


---

$$T(n) = 2 \cdot T(n/2) + n \cdot \lg n$$

$$n \cdot \lg n \neq \Omega(n^{\log_2 2 + \epsilon}) \quad \text{CASO 3}$$

$$\neq \theta(n) \quad \text{CASO 2} \quad \uparrow \text{?}$$

Logo, o TM não se aplica.

$$(3) \quad T(n) = 3 \cdot T\left(\frac{n}{3} + 5\right) + \frac{n}{2}$$

$$\boxed{n = m - 15}$$