Simplified Masters

$$
\begin{aligned}
T(n) = aT(\frac{n}{b}) + \Theta(n^d), \\
a \geq 1, \\
b > 1, \\
d \geq 0.
\end{aligned}
$$

$$
\begin{aligned}
Case1 :& a > b^d \rightarrow T(n) = \Theta(n^{log_b a}) \\
Case2 :& a = b^d \rightarrow T(n) = \Theta(n^d log_b n) \\
Case3 :& a < b^d \rightarrow T(n) = \Theta(n^d)
\end{aligned}
$$

Masters

$$
\begin{aligned}
T(n) = aT(\frac{n}{b}) + f(n), \\
a \geq 1, \\
b > 1.
\end{aligned}
$$

$$
\begin{aligned}
Case1 :& f(n) = O(n^{log_b a - \epsilon}) \rightarrow T(n) = \Theta(n^{log_b a}); \epsilon > 0 \\
Case2 :& f(n) = \Theta(n^{log_b a}) \rightarrow T(n) = \Theta(n^{log_b a} log(n)) \\
Case3 :& f(n) = \Omega(n^{log_b a + \epsilon}) \rightarrow T(n) = \Theta(f(n)); \epsilon > 0 \\
& \text{in } af(\frac{n}{b}) \leq cf(n) \text{ for some } c < 1 \text{ and big enough n} \\
Case2ext :& f(n) = \Theta(n^{log_b a} log^k(n)) \rightarrow T(n) = \Theta(n^{log_b a} log^{k+1}(n))
\end{aligned}
$$

Akra-Bazzi

$$T(n) = \sum_{i=1}^{k} a_i T(b_i n) + f(n) \text{ za } n > n_0,$$

$n_0 \geq \frac{1}{b_i}, n_0 \geq \frac{1}{1-b_i}$ for each i,

$a_i > 0$ for each i,

$0 < b_i < 1$ for each i,

$k \geq 1$,

$f(n)$ is non-negative function

$c_1 f(n) \leq f(u) \leq c_2 f(n)$, for each u satisfying condition: $b_i n \leq u \leq n$

$$T(n) = \Theta(n^p(1 + \int_1^n \frac{f(u)}{u^{p+1}} du))$$

we get p from:

$$\sum_{i=1}^{k} a_i b_i^p = 1$$

Extended Akra-Bazzi

$$T(n) = \sum_{i=1}^{k} a_i T(b_i n + h_i(n)) + f(n) \text{ za } n > n_0,$$

all the conditions from Akra-Bazzi still hold, plus:

$|h_i(n)| = O(\frac{n}{log^2 n})$