Master Theorem

For recursive equations of the form:

$$T(n) = aT(n/b) + f(n)$$

Case 1: $f(n) = O(n^{\log_b a - \epsilon})$ for some constant $\epsilon > 0$.

   Solution: $T(n) = \Theta(n^{\log_b a})$

Case 2: $f(n) = \Theta(n^{\log_b a})$.

   Solution: $T(n) = \Theta(n^{\log_b a} \lg n)$

Case 3: $f(n) = \Omega(n^{\log_b a + \epsilon})$ for some constant $\epsilon > 0$ **and** $f(n)$ satisfies the regularity condition

   $af(n/b) \leq cf(n)$ for some $c < 1$ and sufficiently large n.

   Solution: $T(n) = \Theta(f(n))$

Note: $\log_b a = \frac{\ln a}{\ln b}$ (or $\log_b a = \frac{\log_{10} a}{\log_{10} b}$)