The Master Theorem

Let a be an integer greater than or equal to 1 and b be a real number greater than 1. Let c be a positive real number and d a nonnegative real number. Given a recurrence of the form

$$T(n) = \begin{cases} aT(n/b) + n^c & \text{if } n > 1 \\ d & \text{if } n = 1, \end{cases}$$

then for n a power of b,

1. if $\log_b a < c$, $T(n) = \Theta(n^c)$,
2. if $\log_b a = c$, $T(n) = \Theta(n^c \log n)$,
3. if $\log_b a > c$, $T(n) = \Theta(n^{\log_b a})$.