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Data Structures & Algorithms
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4.) $T(n) = aT(n/b) + f(n)$

where
$a = 2$
$b = 4$
$f(n) = 1$

$n^{\log_b a} = n^{\log_4 2} = n^{0.5}$

$f(n) = 1$ is smaller than $n^{0.5}$ = Case 1

$T(n) = \Theta(n^{\log_4 2}) = \Theta\sqrt{n}$

5.) $T(n) = 2T(\frac{n}{4}) + \sqrt{n}$, $T(0) = 1$

where
$a = 2$
$b = 4$
$f(n) = \sqrt{n}$

$n^{\log_b a} = n^{\log_4 2} = n^{0.5}$

$f(n) = \sqrt{n}$ grows equal than $n^{\log_4 2}$ = Case 2

$T(n) = \Theta(n^{\log_b a} \cdot \log n) = \Theta(\sqrt{n} \cdot \log n)$

6.) $T(n) = 2T(\frac{n}{4}) + n^2$, $T(0) = 1$

where
$a = 2$
$b = 4$
$f(n) = n^2$

$n^{\log_b a} = n^{\log_4 2} = n^{0.5}$

$f(n) = n^2$ grows faster than $n^{0.5}$ = Case 3

$T(n) = \Theta(n^2)$