## T(n) = aT(n/b) + f(n), where T(n) = aT(n/b) + f(n), where T(n) = aT(n/b) + f(n), where $a \ge 1$ , $b > 1 \& f(n) = \theta(n^k \log^p n)$ $a \ge 1$ , $b > 1 \& f(n) = \theta(n^k \log^p n)$ $a \ge 1$ , $b > 1 \& f(n) = \theta(n^k \log^p n)$ Case 1: if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ Case 2: if log a = k, then Case 2: if log a = k, then Case 2: if log a = k, then > **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ > **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ > **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ > **2.2** if p = -1, $T(n) = \theta(n^k \log \log n)$ > **2.2** if p = -1, $T(n) = \theta(n^k \log \log n)$ > **2.2** if p = -1, $T(n) = \theta(n^k \log \log n)$ **2.3** if p < -1, $T(n) = \theta(n^k)$ **2.3** if p < -1, $T(n) = \theta(n^k)$ **2.3** if p < -1, $T(n) = \theta(n^k)$ Case 3: if $\log_b^a < k$ , then Case 3: if $\log_{_{h}}{}^{a} < k$ , then Case 3: if $\log_b^{\ a} < k$ , then > 3.1 if $p \ge 0$ , $T(n) = \theta(n^k log^p n)$ > 3.1 if $p \ge 0$ , $T(n) = \theta(n^k log^p n)$ > 3.1 if $p \ge 0$ , $T(n) = \theta(n^k \log^p n)$ > **3.2** if p < 0, $T(n) = \theta(n^k)$ > **3.2** if p < 0, $T(n) = \theta(n^k)$ > **3.2** if p < 0, $T(n) = \theta(n^k)$ Master theorem Master theorem Master theorem T(n) = aT(n/b) + f(n), where T(n) = aT(n/b) + f(n), where T(n) = aT(n/b) + f(n), where $a \ge 1$ , $b > 1 \& f(n) = \theta(n^k log^p n)$ $a \ge 1$ , $b > 1 \& f(n) = \theta(n^k log^p n)$ $a \ge 1$ , $b > 1 \& f(n) = \theta(n^k log^p n)$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ Case 2: if log a = k, then Case 2: if log a = k, then Case 2: if log a = k, then > **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ > **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} 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\& f(n) = \theta(n^k \log^p n)$ Case 1: if $log_b a > k$ , then $T(n) = \theta(n^{log_b^a})$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ **Case 1:** if $log_b a > k$ , then $T(n) = \theta(n^{log_b})$ Case 2: if log a = k, then Case 2: if log a = k, then Case 2: if log a = k, then **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ > **2.1** if p > -1, $T(n) = \theta(n^k \log^{p+1} n)$ > **2.2** if p = -1, $T(n) = \theta(n^k \log \log n)$ > **2.3** if p < -1, $T(n) = \theta(n^k)$ **2.2** if p = -1, $T(n) = \theta(n^k \log \log n)$ **2.2** if p = -1, $T(n) = \theta(n^k \log \log n)$ > 2.3 if p < -1, $T(n) = \theta(n^k)$ > **2.3** if p < -1, $T(n) = \theta(n^k)$ Case 3: if $\log_b^a < k$ , then Case 3: if $\log_{h}^{a} < k$ , then Case 3: if $\log_{h}^{a} < k$ , then > **3.1** if $p \ge 0$ , $T(n) = \theta(n^k \log^p n)$ **3.1** if $p \ge 0$ , $T(n) = \theta(n^k \log^p n)$ $\Rightarrow$ **3.1** if $p \ge 0$ , $T(n) = 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Case 3: if $\log_h^a < k$ , then Case 3: if $\log_b^a < k$ , then $\succ$ **3.1** if $p \ge 0$ , $T(n) = \theta(n^k \log^p n)$ > **3.1** if $p \ge 0$ , $T(n) = \theta(n^k log^p n)$ **3.1** if $p \ge 0$ , $T(n) = \theta(n^k \log^p n)$ > 3.2 if p < 0, $T(n) = \theta(n^k)$ **3.2** if p < 0, $T(n) = \theta(n^k)$ > **3.2** if p < 0, $T(n) = \theta(n^k)$

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