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T(n) = a T(\frac{n}{b}) + f(n), a > 1, b > 2.

Case 1: if f(n) = O(n^d) and d < \log_a a, then.

T(n) = O(n^{\log_a a})
case 2: if fin) = O(nc) and c = loga, then.

Tin) = O(nwgo algn)
 case 3: if fun) = I (nd) and d > wg, 4 then
           T(n) = 10(fcn))
 case zf = if fin = O(n^{c} lgkn) and c = log_{b}a, then
T(n) = O(n^{b} lgk+1n)
eg. 1. T(n) = 9T(=)+n.
    step 1: a= 9. b=3, fin)=n, logo= logo=2.
    if case #1: f(n) = O(n^d) = ) we need to find the d.

i. d = 1.5
e.g. 2. T(n) = T(\frac{2n}{3}) + 1.
      if case # 1? -> d< 0x d > 0
       if case # 2 > ->fm) = O(n°) = O(n°)= O(1)
         i. T(n) = . O(nolgn) = O(lgn).
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T(n) = aT(\frac{n}{b}) + f(n), \quad a > 1, \quad b > 2.
case 1: \quad if \quad f(n) = O(n^d) \quad and \quad d < \log_b a, \quad then.
T(n) = O(n^{\log_b a}) \quad <= \times
       case 2: if fin) = O(nc) and c = loga, then.

Tin) = O(nvgo (qn)
          (ase 3: if fin) = signal and d > logga, then
                                                                                                 T(n) = ()(fcn))
           case zf = if fin = O(n^c lgkn) and c = log_b a, then
T(n) = O(n^b lgk+ln)
eg. 1. T(n) = 97 (3)+n.
                           Step 1: a = 9. b = 3, f(n) = n, \log_b a = \log_3 9 = 2.

if case #1:. f(n) = O(n^d) = 0 we need to find the d.

i. d = 1 + 2 d < 2.
     e.g.2. T(n) = T(\frac{2n}{3}) + 1.
                                        if case # 1? -> d < 0 = \theta(n^{\circ}) = \theta(n^{
                                                                                    2. Case # 2.
                                                                   :. T(n) = . O(n°lgn) = O(lgn).
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1.3. T(n) = 3T(\frac{h}{4}) + n(gn).

a = 3, b = 4, f(n) = n(gn), \log_4^n = \log_4^3 = 0.793.

\therefore if (ase #1? =) f(n) = g(n^d), ol < 0.793.
eg.3. T(n)=3T(1/4)+n(gn.
   if case #2: => f(n) = O(n^c) = O(n^{0.793}). X

Try case #3:. => f(n) = J(n^d) = J(n^{0.793}). X

J = 0.8, 0.9

... T(n) = O(f(n)) = O(n(gn)), f(n) = is DT
eg. 4. T(n) = 2T(\frac{n}{2}) + n(gn).

a = 2, b = 2, f(n) = n(gn), \log_b a = \log_b^2 = 1
      if case # 1? fin) = O(nd), d< 1 x
      if case #2? fin) = 0 (nc) = 0 (n) x
       if case # 3? fcn)= 52(nd), d>1.
          sc(nd) = sc(n-nd-1) nlgn x
      if case #2f = f(n) = . O(n' (gkn) k= )
         2. 2+ => T(n) = O(nlg?n)
eg.b. T(n) = 9T(3) + n(gn + n2+t.
          : a = 9, b = 3, f(n) = n \lg n + n^2 + 5, c = \log_a 2.

: f(n) = \theta(n^2) = \theta(n^2) = 0 (ase 2.
           2. (m)= O(n°lgn)= O(n²lgn).
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3. T(n)=3T(1)+ ngn.
a=3. b=4. fm= ygn. 109, a=109, X = apply MS2. $a. T(n) = J \pm T(\frac{1}{3}) + n^{2} + lgn.$ b. T(n) = 2T(n-1) + lgn. $c. T(n) = 2T(\frac{1}{3}) + 3T(\frac{1}{4}) + n^{2}$ $d. T(n) = 4T(\frac{1}{2}) + f(n), w/f(n) = O(n^{2}).$ loga = . log 4 = 2 > d. = 2 case / 2 > 0 2 x