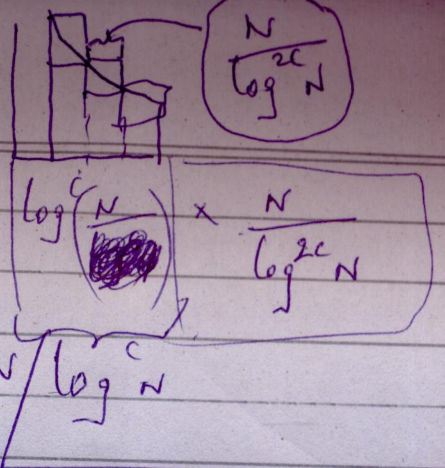
$\boxed{24/6/2013}$

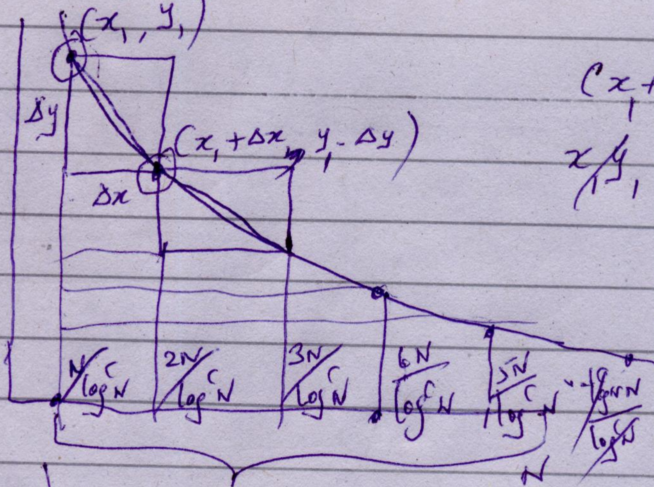
$\boxed{29/6/2013}$

1 to $\log \dfrac{N}{\log^c N}$

$$\log^{c+1}(N)\,\log\log^{c+1}\left(\frac{N}{\log^{2c} N}\right) = O\left(\log^{2c+1}(N)\right).$$



$\boxed{30/6/2013}$



$$(x_1+\Delta x)(y_1-\Delta y) = N$$

$$\cancel{x_1 y_1} - x_1\Delta y + y_1\Delta x - \Delta x\Delta y = \cancel{N}$$

$$y_1\Delta x = \Delta y(x_1+\Delta x)$$

$$\frac{y_1\Delta x}{x_1+\Delta x} = \Delta y$$

$$y_1 = \frac{N}{x_1} \quad \Rightarrow \Delta y = \frac{N\Delta x}{x_1(x_1+\Delta x)} \qquad \Delta x = \frac{N}{\log^c N}$$

$$\sum \Delta y_i = \Delta y = \frac{N \times \dfrac{N}{\log^c N}}{x_1\left(x_1 + \dfrac{N}{\log^c N}\right)} = \frac{\dfrac{N^2}{\cancel{\log^c N}}\ \cancel{\log^c N}}{x_1(x_1\log^c N + N)}$$

$$\Delta y_1 = \frac{N^2}{x_1(x_1\log^c N + N)}$$

$$\sum_{\frac{N}{\log^c N}}^{N} \Delta y_i = N^2\left[\frac{1}{\dfrac{N}{\log^c N}\left(\dfrac{N}{\cancel{\log^c N}}\cancel{\log^c} N + N\right)} + \frac{1}{\dfrac{2N}{\log^c N}\left(\dfrac{2N}{\cancel{\log^c N}}\cancel{\log} N + N\right)} + \cdots\right.$$

$$\sum_{\frac{N}{\log^c N}}^{N} \Delta y_i = \frac{N^2 \log^c N}{N}\left[\frac{1}{(N+N)} + \frac{1}{2(2N+N)} + \frac{1}{3(3N+N)} + \cdots + \frac{1}{\log^c N(\log^c N\, N+N)}\right]$$

$$= \frac{\cancel{N^2}\log^c N}{\cancel{N \times N}}\left\{\frac{1}{1(1+1)} + \frac{1}{2(2+1)} + \frac{1}{3(3+1)} + \cdots + \frac{1}{\log^c N(\log^c \ldots}\right.$$

$$\leq \log^c N \left\{\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots + \frac{1}{\log^{2c} N}\right]$$

$$< \boxed{\log^c N \;\cancel{\frac{\pi^2}{6}}}$$ Riemann Zeta function $(s=2)$

Each row slice is $\log\log N$

Total time for $\frac{N}{\log^c N}$ to N is $O(\log^c N \log\log N)$

$$= O(\log^{c+1} N).$$

Recursion stops when

$N = \log^{qc} N$

$\log N = qc \log\log N$

$q = \frac{\log N}{c \log\log N}$

1 to $\frac{N}{\log^c N}$ is searched recursively

with above algorithm

$$O(\log^{c+1} N) + O\left(\log^{c+1} \frac{N}{\log^c N}\right) + O\left(\log^{c+1} \frac{N}{\log^{2c} N}\right.$$

$$\left((q+1)\log^{*} N\right)^{c+1}$$

$$\leq \left(\frac{\log N}{c\log\log N}+1\right)^{c+1} \log^{c+1} N$$

(or)

$$\leq \left(\log N+1\right)^{c+1} \log^{c+1} N$$

$$= \Theta\left(\log^{c+1} N \, \log^{c+1} N\right) = \boxed{\Theta\left(\log^{2c+2} N\right)}$$

Should it be theta bound? or Big O

(or) it can be $\boxed{\Theta\left(\dfrac{\log^{(2c+2)} N}{\left(\log\log N\right)^{(c+1)}}\right)}$

Ka. Shrinivaasan
30/6/2013