2/5

COS 488 Problem Set #3 Question #1

Tim Ratigan

February 23, 2017

Note that $f(N) := \frac{\alpha^N}{\beta^N} = (\alpha/\beta)^N = e^{N \log(\alpha/\beta)}$. Since $\alpha < \beta$, we have $\alpha/\beta < 1$ so $\log(\alpha/\beta) < 0$. If $k = |\log(\alpha/\beta)|$, then in particular $\left(\frac{\alpha^N}{\beta^N}\right)^{k^{-1}} = e^{-N}$. Now, suppose that $f(N) = O(1/N^{Mk})$ for some constant $M > 0$. Then $e^{-N} = O(1/N^M)$ which contradicts that it itself is exponentially small.

-3pts, what about the absolute/relative errors? Be more careful w/ your write-ups