

We order the functions as follows.

- g_1 comes before g_5 . This is like the solved exercise in which we saw $2\sqrt{\log n}$. If we take logarithms, we are comparing $\sqrt{\log n}$ to $\log n + \log(\log n) \geq \log n$; changing variables via $z = \log n$, this is $\sqrt{z} = z^{1/2}$ versus $z + \log z \geq z$.
- g_5 comes before g_3 , since $(\log n)^3$ grows faster than $\log n$. (They're both polynomials in $\log n$, but $(\log n)^3$ has the larger degree.)
- g_3 comes before g_4 : Dividing both by n , we are comparing $(\log n)^3$ with $n^{1/3}$, or (taking cube roots), $\log n$ with $n^{1/9}$. Now we use the fact that logarithms grow slower than exponentials.
- g_4 comes before g_2 , since polynomials grow slower than exponentials.
- g_2 comes before g_7 : Taking logarithms, we are comparing n to n^2 , and n^2 is the polynomial of larger degree.
- g_7 comes before g_6 : Taking logarithms, we are comparing n^2 to 2^n , and polynomials grow slower than exponentials.