Algorithms. Assignment 1

Reading week 1, 2022

1 Combinatorics

1. How many different ways are there to order a list containing 99 distinct elements?

2. A graph is *complete* if any pair of its vertices is connected by an edge. How many edges are there in a complete graph with 4 vertices? What about 40 or, more generally, n vertices?

3. How many different ways are there to order the letters contained in the word "engineering"?

2 Asymptotic order

Take the following list of functions and arrange them in ascending order of growth rate. That is, if function $f(n)$ comes before function $g(n)$ in your list, then it should be the case that $f(n)$ is $\mathcal{O}(g(n))$.

$$
\begin{aligned}
f_1(n) &= 4^n \\
f_2(n) &= n^{1.5} \\
f_3(n) &= 2^{2^n} \\
f_4(n) &= n^{100} \\
f_5(n) &= 2^{n^2} \\
f_6(n) &= n(\log n)^2 \\
f_7(n) &= n^{\log n}
\end{aligned}
$$