Advanced Algorithms
Homework Set 1
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Problem 1 Show that $\left\lceil \lg \binom{m+n}{n} \right\rceil \leq m+n-1$ for all integers $m, n \geq 1$, where the binomial coefficient is equal to $\frac{(m+n)!}{m!n!}$.

Problem 2 Count the number of inversions for the permutation

$$5\ 7\ 1\ 4\ 3\ 2\ 6.$$

Problem 3 Explain when we can say that an algorithm for solving a problem is *optimal*, in the sense of theoretical analysis.

Problem 4 Show that to find the largest number in an array of n numbers requires at least $n-1$ comparisons.