

Homework 2(Posted 17th January, Due before 11:59 p.m. 30th
January, 120 pts)

Please submit hard copies to Ms. Drucilla Spanner, slide in her office if she is not there. Please submit each question separately. Please email programs to P.A.

Problem 1: 10 pts 2.1, Weiss

Problem 2: 20 pts 2.2, Weiss

Problem 3: 5 pts 2.3, Weiss

Problem 4: 5 pts 2.4, Weiss

Problem 5: 5 X 3 pts

1. Find two functions $f(N)$ and $g(N)$ such that neither $f(N) = O(g(N))$ nor $g(N) = O(f(N))$.
2. Find the functions such that both are continuous (if your answer to the first part satisfies this property then you may use the same functions here as well).
3. Find the functions such that both are continuous and nonnegative (if your answer to the first or second part satisfies this property then you may use the same functions here as well).

Problem 6: 4 + 5 + 5 + 6 + 7 + 8 pts 2.6 (a), Weiss

Problem 7: 30 Find the maximum subsequence product for a list of positive numbers with the first number 1. Present $O(N^3)$, $O(N \log N)$, $O(N)$ algorithms for this purpose, similar to the versions for the maximum subsequence sum algorithms taught in class. Program each variant. You should submit two versions of each variant to the P.A.

1. The first version reads the number of elements in the list and then the numbers in the list from the standard input and generates the result. The first element is 1 and is not in the input.
2. The object of the second version is to test the running times for large input size. For this the second version solves the problem for a large list of known numbers. Consider a list with first element 1 and the all other numbers are 1.1. (For example, in C represent the list by an array where the first element is 1 and the rest are 1.1). Plot the runtime of each of the variants for list size from 100 to 100,000 at a suitable interval (say 1000 or so). For simplicity, you can have one program where you call the maximum subsequence product different times, and keep a record of the computation time for each of the instances. Contact the instructor or PA if this sounds confusing. Does your plot resemble the functions you would expect? (plot ratios between the run times and the functions you would expect).