CP2 : Reading Material V

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Contents

1 FFT

Reading Material

You can either read this post on codeforces, or Chapter 30 of CLRS (depending on how much formalism you like).

Exercises

This video has a lot of very good problems; for most of them you'll have to listen to the solution as well, and this is fine.
Then solve

- 528D
- 632E

again, the problems are not easy, don't feel bad if you have to read editorials (but try to solve for an hour or so at least).

Implementation tips

FFT is not trivial to implement, and it is definitely not trivial to get a good, tight implementation. So my advice is similar as for max-flow; write (or copy with attribution) a good iterative FFT implementation (yes, iterative implementation exists), and reuse everywhere, and make it a part of your ICPC team codebook. CLRS goes into this at some length, so it is good idea to read from there.

2 FFT on $\mathbb{Z}_p$

Reading material

The most common use case (in programming contests) is the so-called `number theoretic transform`. You can either

- read this post on codeforces (the section called NTT)
- or work it out yourself; for this read Problem 30-6 of CLRS (you know this is the correct option, select this one). For this, you will also need to be comfortable with the first three sections of chapter 31 (especially the third).

Exercises

- 300D

3 Optional: Division and Multi-point evaluation

This is not very commonly used, but the results are surprising, and this was featured in a codechef long challenge problem.
Multi-point evaluation is also CLRS problem 30-5, in case you feel brave and want to work it out on your own.