Problem Name	Category	level	Sol	Category ID	Importance	Can't solve
LIVEARCHIVE 2236	ad-hoc	9		[1]		
LIVEARCHIVE 7156	ad-hoc	9		[1]		
LIVEARCHIVE 4121	ad-hoc	8.75		[1]		
CSA4-F	ad-hoc	8.5		[1]		
LIVEARCHIVE 2993	ad-hoc	8.5		[1]		
LIVEARCHIVE 3568	ad-hoc	8.5		[1]		
LIVEARCHIVE 4785	ad-hoc	8.5		[1]		
LIVEARCHIVE 7162	ad-hoc	8.5		[1]		
LIVEARCHIVE 7588	ad-hoc, analysis	8.5		[1]		
LIVEARCHIVE 2480	ad-hoc, annoying	8.5		[1]		
kattis hanoi18.bipartitebattle	ad-hoc, games, bipartite graphs, combinatorics, [https://people.eecs.berkeley.edu	8.5	Sol	[1]		
LIVEARCHIVE 2998	ad-hoc	8.25		[1]		
CF1097-D12-E	ad-hoc, constructive	8		[1]	p3	
CF1070-D12-L	ad-hoc, constructive, probability, bits	8		[1]	p3	
LIVEARCHIVE 6397	ad-hoc	8		[1]		
LIVEARCHIVE 6770	ad-hoc, analysis, precalc	8		[1]		
CS47-F	ad-hoc, hamiltonian, impl	8		[1]		
LIVEARCHIVE 6774	ad-hoc, hashing	8		[1]		
CSA1-G	ad-hoc, impl	8		[1]		
LIVEARCHIVE 8045	ad-hoc, observations	8		[1]		
LIVEARCHIVE 3567	ad-hoc, observations, divisors	8		[1]		
CF930-D1-D	ad-hoc, probability, combinatorics	8		[1]		
CF1179-D1-E	ad-hoc, d&c, quick select, interactive	7.75		[1]	p4	
CSA58-G	ad-hoc	7.75		[1]		1
CF1063-D1-E	ad-hoc, constructive	7.5		[1]	p4	
AtCoder003-AGC-E	ad-hoc, binary search, observations, [1. reversing the operations 2. using the fac	7.5		[1]	p3	
AtCoder006-AGC-E	ad-hoc, observations, [3x3 matrix rotate, invariants]	7.5		[1]	p3	
CF101889-gym-L	ad-hoc, preprocess, prefix sum, binary search	7.5		[1]	p3	
CF914-D12-F	ad-hoc, bitset or bf or suffix array, kmp	7.25	Sol	[1]	p4	
CF1081-D12-F	ad-hoc, probability, bitset, interactive	7.25		[1]	p4	
CF128-D1-D	ad-hoc	7.25		[1]		

CF128-D1-D	ad-hoc	7.25		[1]		
LIVEARCHIVE 4786	ad-hoc	7.25		[1]		
LIVEARCHIVE 6037	ad-hoc, analysis, simulation	7.25		[1]		

Info | General Category | General Level | IOI Category | IOI Level | IOI Contest | Submissions | Categories

What	- **Problems Lists** Created by Dr Mostafa Saad Ibrahim (mostafa.saad.fci@gmail.com) - These are the private problems lists for supervising my trainees for **ICPC / Online Contests / IOI**. - I am releasing for the public in hope making trainees training much more efficient and effective - Note: If you are a beginner, there is well-organized roadmap for a better start for you [links in end of page]
Audience	- Training for online contests, ICPC or IOI - Searching for problems with specific categories - Tired from 'automatic tools for ranking problems by difficulty' - You train a lot but many problems are not that interesting or have duplicate ideas
Background	During my weekly meetings with the PhD supervisor, I was inspired by launching an online program that I named Supervision. Instead of the coaching style, my major role as a supervisor was to assign problems in the trainee sheet. My goal was to assign problems that match the trainee level and enhance weak skills. As I don't have to help technically in solving problems, and I don't believe in the importance of that, I had much more time to supervise ~225 trainees. This gave me a unique opportunity to accumulate a huge amount of statistics and useful information from trainees about the tackled problems (~25k submissions). The program started in 2016 for Egyptians, in 2017 for Arabs and for international students since 2018.
Outcomes of supervision	Based on the received feedback from my trainees, I used to refine my vision for this program. I ended up with 2 big lists of problems: one for guys training toward IOI and another for ICPC/OnlineContest styles. Specifically 4 critical features: **Problem difficulty level** [1-10] per problem is a manual weighted average of the assigned levels from my trainees' sheets. A common complaint about 'online tools/ways for ranking problems by difficulty' is that they are not accurate. The issue is more severe for OI problems. **Problem importance level**: ~ 5 levels (important, very interesting, interesting, good, normal/boring/repeated). Trainees solve a lot of problems that many of them are repeated or boring ideas. To maximize the training outcomes, one should train on unique/interesting ideas much more. Something that most of us can't figure out easily. **Editorials**. Many interesting problems may not have editorials (or have hard to understand editorials). I used to ask trainees to write some summary of how they solved a problem. Circulating these editorials between my trainees made it easy for them to get problems solved. **Submissions info**: In Trainees Submissions page, ~25k submissions of my trainees. Per problem info (status, submissions count, times for reading/thinking/coding/debugging, category, subjective level, and a comment. You may use it to know some details about how others performed with the solved problem.
Problem Level	In column C, you will find the problem diffculty. I tried to rate a problem relative to **CodeForces** levels as following: CF-Div2-A => 1 - 2 CF-Div2-B => 1.5 - 3 CF-Div2-C => 3 - 5.5 CF-Div2-D => 5 - 6.5 CF-Div2-E => 6 - 7.5 CF-Div1-D => 7 - 8.5 CF-Div1-E => 8 - 9.75

As a fact, I did not solve most of the problems. My trainees did for many of them. Based on that, I tried manually to put a level for the problem. Since the middle of 2018, all my trainees found most of the problems of the right level relative to their skills. I can say this column now is accurate to some extent.

Info | General Category | General Level | IOI Category | IOI Level | IOI Contest | Submissions | Categories

Problem Name	Category	Level	Sol	Category ID	Importance	Can solv
IOI 12-odometer	~~ad-hoc, long impl, optimizations, [tedious, boring]~~	~~8~~	Editorial	[1]		~~2~~
IOI 10-maze	~~ad-hoc, heuristics, constructive, [output only], [bad editorial], [not good problem]~~	~~8~~	Editorial	[1]		1
CEOI 15-nuclearia	ad-hoc, long impl	8	Editorial	[1]		
Balkan 17-sheets	ad-hoc	8		[1]		
APIO 12-Kunai	ad-hoc, [https://tioj.ck.tp.edu.tw/problems/1519]	7.75	Sol	[1]		2
Balkan 15-RADIO	ad-hoc, impl	7.75	Sol (no ec	[1]		
IOI 14-rail	ad-hoc, cases analysis, observations	7.5	Sol	[1]	p3	2
IOI 11-parrots	ad-hoc, data compression, bigInteger	7.5	Editorial	[1]		2
APIO 12-Guard	ad-hoc, [https://tioj.ck.tp.edu.tw/problems/1430]	7.5		[1]		1
IOI 19-line	ad-hoc, impl	7.5	Sol	[1]		1
JOISC 19-Minerals	ad-hoc, d&c, [const factor optimizations]	7.5		[1]		
IOI 03-reverse	ad-hoc, optimizations	7.25	Editorial	[1]	p3	
COI 14-gta	ad-hoc, string, transformations	7.1	Sol	[1]	p4	2
IOI 16-messy	ad-hoc, interactive, d&c, bits, [hard to impl]	7	Sol	[1]	p4	
JOISC 18-airline	ad-hoc, interactive, DAG, [communication style]	7	Sol	[1]	p4	
IOI 15-towns	ad-hoc, interactive	7	Sol	[1]	p3	1
Balkan 11-cmp	ad-hoc	7	Editorial	[1]		
POI 10-Hamsters	ad-hoc?	7	Editorial	[1]		2
CEOI 14-questiongrader	ad-hoc, encoding, [different grader, where statement?], [Sperner's theorem]	7		[1]		
IZhO 18-NiceGift	ad-hoc, logic	7		[1]		1
POI 06-Crystals	ad-hoc	7	Editorial	[1]		1
IOI 05-garden	ad-hoc, sliding window, dp	7	Editorial	[1]		1
ROUSelection 18-anagram_sort	ad-hoc, permutations, interactive, [HKOI 11-stones]	7		[1]		
IOI 06-blackbox	~~ad-hoc, [avoid, weird, stef don't understand problem nature]~~	~~7~~	Editorial	[1]		
COCI 17-retro	ad-hoc, string parsing	7		[1]		
COCI 18-kotrljanje	ad-hoc, math, [very short code? maybe trivial]	7		[1]		
IOIPractice 16-telegraph	ad-hoc, quick sort, [judge not working]	7		[1]		
POI 04-Tournament	ad-hoc, games or scc, topological sort, MLE	6.9	Sol	[1]	p4	
APIO 16-gap	ad-hoc, d&c, interactive, pigeonhole principle	6.75	Sol	[1]	p3	
IZhO 19-Xoractive	ad-hoc, bits, interactive	6.75	Sol	[1]	p3	
IOI 12-supper	ad-hoc, datastructures, [communication], [solve POI 05-ToyCars first]	6.75	Editorial	[1]	p3	1

IOI 12-suppel	ad-hoc, datastructures, [communication], [solve POI 05-10yCars first]	6.75	Editorial	[1]	p3	
Info1Cup 18-Hidden	ad-hoc, interactive, impl	6.75	Sol	[1]	p3	
POI 10-Ones	~~ad-hoc, bits, bignum, [annoying, avoid]~~	~~6.75~~	Editorial	[1]		

Info | General Category | General Level | **IOI Category** | IOI Level | IOI Contest | Submissions | Categories

Name	Category	Level	Sol	Category ID	Importance	Ca sc
Balkan 15-TILING	todo	9		[222]		
Balkan 16-Hacker	todo	9		[222]		
JOIOC 14-migration	todo	9		[222]		
Balkan 17-tale	geometry, impl	9		[37]		
IOIPractice 16-tree-square	graph	9		[46]		
JOIOC 14-space_pirate	graph, dfs, long impl	9		[50]		
ROUSelection 18-generating_set	math, permutations, swaps, queries, impl, [restrict time]	9		[68]		
CEOI 18-Fib	segment tree, fib, impl	8.5	Editorial	[13]		
ROUSelection 18-sortall	bit, impl	8.5		[15]		
CEOI 19-Scissors	todo	8.5	Editorial	[222]		
IOI 19-walk	todo	8.5	Official sols	[222]		
ROUSelection 18-tournament	todo, hmm, preprocessing, impl	8.5		[222]		
APIO 18-newhome	datastructures, segment tree, d&c	8.25	Sol	[4]	p5	
IOI 18-meetings	segment tree, [solve CODECHEF SAFPAR first]	8.1	Sol	[13]	p4	
USACO 19feb-mowing-plat	dp, dp_trick, montonic queue	8	Sol	[130]	p3	
CEOI 19-Skyscrapers	graph, scc, biconnected components, dsu	8	Editorial	[64]	p3	
CEOI 19-Diameter	segment tree, hld, centroid decomposition or others	8	Editorial	[13]	p2	
IOI 12-odometer	~~ad-hoc, long impl, optimizations, [tedious, boring]~~	~~8~~	Editorial	[1]		
IOI 10-maze	~~ad-hoc, heuristics, constructive, [output-only], [bad editorial], [not good problem]~~	~~8~~	Editorial	[1]		
CEOI 15-nuclearia	ad-hoc, long impl	8	Editorial	[1]		
Balkan 17-sheets	ad-hoc	8		[1]		
Balkan 17-strings	bbst, treap	8		[106]		
POI 15-Sorcerer	~~impl, [official is too many cases to handle], ignore~~	~~8~~	Editorial	[109]		
CEOI 13-splot	~~impl, [very specific - don't assign]~~	~~8~~	Editorial	[109]		
CEOI 13-watering	impl, [very specific - don't assign], [output-only], [code then change output!]	8	Editorial	[109]		
EJOI 17-camel	impl, ???	8		[109]		
MCOCAMP 16-flipbrackets	graph, hld, datastructures, impl	8	Sol (no edi	[122]		
POI 09-Algorithm_Speedup	dp, impl, [not nice]	8	Editorial	[16]		
APIO 11-guessword	todo, [https://www.acmicpc.net/category/detail/221 - http://140.136.150.68/judge/pr	8		[222]		
CCO 18-FunPalace	todo	8		[222]		
JOIOC 17-golf	todo	8		[222]		

JOISC 17-golf	todo	8		[222]
JOISC 15-aaqqz	todo	8		[222]
JOISC 15-keys	todo	8		[222]

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Problem Name	Category	Level	Sol	Category ID	Importance
APIO 07-Backup	greedy, matching, datastructures, [=JOISC 18-candies]	7.1	Sol	[32]	p4
APIO 07-MOBILE2	greedy or d&c	5	Sol	[32]	
APIO 07-Zoo	dp, dp_bitmasks, sliding window, [max-sat]	6.3	Sol	[24]	p3 v2
APIO 08-Beads	binary search, persistence	6	Sol - Do local t	[9]	
APIO 08-DNA	dp, dp_counting, dp_build_output	6	Sol	[26]	p2
APIO 08-Roads	greedy, mst, [badly integrated checker, http://apio-olympiad.org/2008/], [english txt:	5	Sol	[32]	p3
APIO 09-ATM	graph, scc, dp_sibling, [https://www.acmicpc.net/category/detail/223]	6.5	Sol	[61]	
APIO 09-Convention	datastructures, binary lifting, greedy, observations, [https://www.acmicpc.net/categc	7.75	Sol	[4]	p2
APIO 09-Oil	ad-hoc, d&c, 2d prefix sums, 2d sliding window, impl [https://www.acmicpc.net/cate	6.25	Sol	[1]	p2
APIO 10-Commando	dp, dp_convex_hull, math, [type 1, =SPOJ APIO10A, ~=kattis coveredwalkway]	6.25	Sol	[124]	
APIO 10-Patrol	dp, dp_sibling, [cases]	6.8	Sol	[115]	p4
APIO 10-Signaling	geometry, sweep line, cirles, combinatorics, impl, interactive, [https://tioj.ck.tp.edu.t	7	Sol	[44]	
APIO 11-Color	graph, dfs, eqs or 2-sat, xor	7	Sol	[50]	p5
APIO 11-guessword	todo, [https://www.acmicpc.net/category/detail/221 - http://140.136.150.68/judge/pr	8		[222]	
APIO 11-Path	graph, sp, grid compress, sweep line, impl	7	Sol	[46]	p3
APIO 12-Dispatching	graph, trees, datastructures, dsu-on-trees, [https://tioj.ck.tp.edu.tw/problems/1429]	6	Sol	[46]	p3
APIO 12-Guard	ad-hoc, [https://tioj.ck.tp.edu.tw/problems/1430]	7.5		[1]	
APIO 12-Kunai	ad-hoc, [https://tioj.ck.tp.edu.tw/problems/1519]	7.75	Sol	[1]	
APIO 13-Robots	dp, dp_table, bfs, long impl, [tight time]	7	Sol	[23]	p2
APIO 13-tasksauthor	todo, [output only]			[222]	
APIO 13-Toll	graph, mst	7.75	Sol	[60]	
APIO 14-Beads	dp, dp_sibling, [**hard impl** and tricky cases]	7.1	Sol	[115]	
APIO 14-Palindrome	string processing, suffix array, impl, [=SPOJ APIO14_A, https://tioj.ck.tp.edu.tw/prol	7.75	Sol	[104]	
APIO 14-Sequence	dp, dp_convex_hull or dp_d&c_opt, [strict time, easy for one knows these technique	6.25	Sol	[124]	
APIO 15-bridge	datastructures, math, **median**, [solve IOI 11-ricehub first]	6.75	Sol	[4]	p3 v1
APIO 15-sculpture	greedy, dp, [=CF981-D12-D]	6.5	Sol	[32]	
APIO 15-skyscraper	graph, dijkstra, [some tricks]	6.1	Sol	[52]	p3 v2
APIO 16-boat	dp, dp_state_reduce, combinatorics, [dublicate counting]	7.1	Sol	[18]	p3
APIO 16-fireworks	dp, slope_trick, datastructures	7.5	Sol	[16]	p5
APIO 16-gap	ad-hoc, d&c, interactive, pigeonhole principle	6.75	Sol	[1]	p3
APIO 17-koala	binary search, game, long impl, interactive	7.5	Sol	[9]	

APIO 17-koala	binary search, game, long impl, interactive	7.5	Sol	[9]	
APIO 17-merchant	graph, floyd, binary search	6.7	Sol	[55]	p4
APIO 17-rainbow	segment tree, persistent, euler's formula or datastructures	7.1	Sol	[13]	p4

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