### **Online Judges And Tutorial Sites**

## http://online-judge.uva.es/ and http://cii-judge.baylor.edu/

University of Valladolid 24-hour Online Judge and Offical ACM/ ICPC Live archive contains all problems of ACM Regionals.

## http://acm.timus.ru/

24-hour Online Judge hosted by Ural State University of Russia. This site contain the problems from many Russian contest. This can be very useful site for students to practice. From this site we can understand how these Russian Problems differ from non-Russian problems.

## http://plg.uwaterloo.ca/~acm00/

This is the contest page of University of Waterloo. This university currently leads the contest arena of the World. They arrange programming contest almost in every alternate term and problems of these contest set standard for many other universities.

## http://oldweb.uwp.edu/academic/mathematics/usaco/ and http://ace.delos.com/

Online training site for contests which guides beginners with a step by step problem solution.

## http://www.acmsolver.org/

Another training site for 24-hour online programming contest developed by "Ahmed Shamsul Arefin" mainly for novice programmers now linked with world's major online judges.

#### http://www.acm.inf.ethz.ch/ProblemSetArchive.html

This site is the best resource for the past ACM Regionals and World Finals problem set. It has also solutions and judge data for many contests, which will help us for practice.

## http://acm.uva.es/problemset/replies.html

This page contains the information about the meaning of different judge replies. This is also a link page of the site acm.uva.es.

#### http://contest.uvarov.ru/

This is the POTM master's home page. POTM Contest means Programmer of the Month Contest. The problem set of this contest is different then the conventional programming contest. The organizer gives more stress on Optimization than number of solution.

### http://www.acmbeginner.tk

Is it very difficult to disclose oneself as a good programmer? To solve the problems, the difficulty that you face in the 24-hour online judge and the help and guideline that found to overcome them is integrated in this site "ACMBEGINNER" by M H Rasel.

## http://groups.yahoo.com/group/icpc-l http://groups.yahoo.com/group/acm\_solver

You talk about algorithms, data structures and mathematical concepts. The group is made for teams, ex-teams and everybody interested in on-line programming. Coaches and teachers are very welcome.

### Site of Pioneers !

## Newcomers advice, by Shahriar Manzoor

One of the greatest programmer/ problemsetter of acm.uva.es as well as a renowned progeammer of Bangladesh, advices the newcomers. He is now the judge of UVa OJ site and WF. He is also the elite panel problem setter of the site acm.uva.es. you can visit his publication by the using the URL <u>http://www.acm.org/crossroads/xrds7-5/</u>

### World of Steven, by Steven Halim

Steven Halim published his site for the problem solvers including the problemset tricks tutorials with the difficulty level. In his site he has also categorized problems. This site contains almost all hints of the problems that he has solved. You can visit the site using the link <u>http://www.comp.nus.edu.sg/~stevenha/programming/acmoj.html</u>

## **Reuber Guerra Duarte**

Reuber Guerra Duarte developed this site with some solutions (the real source code) for some problems that already solved by him. Please don't directly send his solutions to judge. <u>http://www.dcc.ufmg.br/~reuber/solutions/index.html</u>

## Ed's Programming Contest Problem Archive by Ed-Karrels

Ed-karrel one of the greatest problem setter publish this site with the solutions to many problems. visit the site with the URL <u>http://www.karrels.org/Ed/ACM/prob\_index.html</u>

### Mark Dettinger

A living legend of programming contest. He was a main contest architect of the University of ULM, Germany. Now this responsibility lies on another person Water Guttman. If you visit the site you will find many useful link as well as many interesting incidents of his life and onmces again you will realize again that the boy gets eleven in math out of hundred can also be genius. URL <u>http://www.informatik.uni-ulm.de/pm/mitarbeiter/mark/</u>

### Books

## Introduction to Algorithm (CLR)

Introduction to Algorithms (MIT Electrical Engineering and Computer Science Series) by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest. Now they already publish the 2nd Edition + Stein as the 4th author. This book is a-must-have to be a good programmer.

### **Algorithm Design Manual**

The Algorithm Design Manual by Steven S. Skiena (+ book website). Also a-must-have for every good programmer.

## The Art of Computer Programming

The Art of Computer Programming, Volumes 1-3 Boxed Set by Donald E. Knuth. Hard to understand for beginner but worth to read

## **Concrete Mathematics**

Concrete Mathematics, Second Edition + by Ronald L. Graham, Donald E. Knuth, Oren Patashinik. This book contain mathematical problem and solutions, but This is very hard to understand. Though it is hard, it is very useful for programming contest. Several formulation techniques discussed here.

### Number Theory

Number Theory by S G Telang is a book, consists of lot of knowledge about the number theory. It is better idea to read this book before reading the book Concrete Mathematics. This is easy to understand.

### **Discrete Mathematics And Its Application**

Discrete Mathematics And Its Application by Kenneth H. Rosen consists of a lot of practical help on integer matrices, mathematical reasoning, counting, graph tree problems.

## Data Structure Using C and C++

Data structure using C and C++ by ,Yedidyah Langsam, Moshe J. Augenstein Aaron M. Tenenbaum. Second Edition. This book contains basic problem related to Data Structures with C coding.

## **Programming Challenges**

Programming Challenges, by Steven Skiena Miguel Revilla. We dont want to say anything about this two legend. All the programmers are familiar with this two ultimate Programming Contest Legends. Use this book to learn what to do for the programming contest.

### **Art of Programming Contest**

Well, Art of Programming Contest is this one, by Ahmed Shamsul Arefin.

### **Programming Language Guides**

http://www.sgi.com/tech/stl/

In this site you will find the STL documentation. The STL is very important for programming. It is efficient and make code simple and sort. To use this the C++ template knowledge is necessary. The beginner can overlook the STL at beginning but is is needed in future.

### www.cplusplus.com / www.cprogramming.com

Great sites for the C/C++ programmers. These sites contains documents, References, sources codes with electronic forum where you can consult with great programmers.

### Mathematics Site

## mathworld.wolfram.com

MathWorld is a comprehensive and interactive mathematics encyclopedia intended for students, educators, math enthusiasts, and researchers. Like the vibrant and constantly evolving discipline of mathematics, this site is continuously updated to include new material and incorporate new discoveries.

### http://mathforum.org/

The Math Forum is a leading center for mathematics and mathematics education on the Internet. Its mission is to provide resources, materials, activities, person-to-person interactions, and educational products and services that enrich and support teaching and learning in an increasingly technological world.

### http://www.math.com/

Math.com is dedicated to providing revolutionary ways for students, parents, teachers, and everyone to learn math. Combining educationally sound principles with proprietary technology, Math.com offers a unique experience that quickly guides the user to the solutions they need and the products they want.

### http://www.math-net.org/

Math-Net intends to coordinate the electronic information and communication activities of the global mathematical community with the aim to enhance the free-flow of information within the community.

#### **REFERENCES:**

### REFERENCES

[1] "HOW TO DO BETTER IN 24 HOURS ONLINE JUDGES", Anupam Bhattacharjee, Published by ACMSolver.org, 2003.

[2] "World of Seven", METHODS TO SOLVE VALLADOLID ONLINE JUDGE PROBLEMS, Steven Halim, National University of Singapore, http://www.comp.nus.edu.sg/~stevenha/

[3] ACMSolver.org, ACM/ICPC Programming Contest Tutorial Website for Valladolid OJ by Ahmed Shamsul Arefin <u>http://www.acmsolver.org</u>

[4] "Theoretical Computer Science Cheat Sheet", Steve Seiden, http://www.csc.lsu.edu/~seiden

[5] "Teach Yourself C in 21 Days", Peter Aitken, Bradley L. Jones, website: http://www.mcp.com/info/0-672/0-672-31069-4/

[6] "Common Mistakes in Online and Real-time Contests", Shahriar Manzoor, ACMCross Roads Student Magazine, <u>www.acm.org/crossroads/xrds7-5/contests.html</u>

[7] Verhoeff, T. Guidelines for Producing a Programming-Contest Problem Set: http://wwwpa.win.tue.nl/wstomv/publications/guidelines.html

[8] Ernst, F., J. Moelands, and S. Pieterse. Teamwork in Programming Contests: 3 \* 1 = 4, Crossroads, 3.2. <u>http://www.acm.org/crossroads/xrds3-2/progcon.html</u>

[9] STL (Standard Template Library), Silicon Graphics, Inc, http://www.sgi.com/tech/stl/

[10] ACMBeginner.tk, ACM Valladolid Online Judge (OJ) Tools, Tips and Tutorial by M H Rasel, <u>http://www.acmbeginner.tk/</u>

[11] Brian W. Kernighan- "Programming in C: A Tutorial" http://www.lysator.liu.se/c/bwk-tutor.html

[12] Rob Kolstad, USACO Training Gateway, http://ace.delos.com/

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