

ACM-ICPC Thailand Central Group B Training Program

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Competitive Programming

- Programming Contest: Give problems that must be solved using computer programming.
- Many programming contests
 - ACM-ICPC:
 - Country, Regional, World Finals.
 - Other Contests:
 - ICFP Programming Contest
 - Google Summer of Code
 - Many more



Competitive Programming

- In most competition, the given problems are wellknown Computer Science
- Well-known → Search, Greedy, DP, etc.
 - Has solutions
 - Can be solved using known algorithms.
 - The Trick???? Understand the problem
- Software development.
- Good style of programming with comments
 - Limited amount of comments.



Tips to be COMPETITIVE



Tip 0: Teamwork

- A three-person team
- 1 Computer
- 3 person...
- Who does what?
 - 1 Coder and 2 solve problem at any given time?
 - 1 person solves 1 problem at a time?
 - All three solve the problem togther?

Tip 1: Type Fast & Correct & In advance

No Kidding, this can be VERY important.

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- Similar input scan, output print format...
 - Do it once and then just copy and paste.
- How to be better?

Program more. A lot more. Know the pattern, know what is needed.



Tip 2: Quickly read the question and Identifying problem types

- Ad Hoc
- Complete Search
- Divide and Conquer
- Greedy
- Dynamic Programming

- Graph
- Mathematics
- String Processing
- Computational Geometry
- Others



Understanding the question

- Read the problem carefully
- Pay attention to input/output description and the sample input/output.
- Do not assume (just because the examples have certain properties)
 - Make note of special inputs (break sequence, end of line, etc)



Tip 3: Do Algorithm Analysis

- Constraints in the problem statement
 - MUST KNOW THEM esp. Time Limits
- Don't be afraid to use the simplest that works
 - Efficiency is key??? Not really
 - Check maximum possible size and decide if brute force will be ok.
- At least do some basic analysis to convince that it will work BEFORE begin coding.



Tip 4: Master Programming Language(s)

 Goal: Able to QUICKLY translate the solution into a bug-free code.

- If no time, Master ONE & ONLY ONE programming languages
 - Save time of checking references
 - Use shortcuts, macros
 - Use libraries whenever possible
 - Know basic functions by heart

ACM-ICPC: Input

- Java Language
 - Input comes form System.in and output goes to System.out (no File IO allowed).

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- The source file must contain a class called <u>Main</u> with the entry-method <u>main</u>: public static void main(String[] args) { ... }.
- C++ Language
 - Input comes form std:cin and output goes to std:cout (no File IO allowed).
 - The source file must contain the entry-function int main() {
 ... }.

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```
#include<stdio.h>
int main() {
  long p,q,r;
   while (scanf("%ld %ld",&p,&q)
                !=EOF) {
     if (q>p) r=q-p;
     else r=p-q;
     printf("%ld\n",r);
```

```
#include<iostream.h>
void main()
long long a,b,c;
while (cin>>a>>b) {
   if (b>a)
      c=b-a;
   else
      c=a-b;
   cout << c << endl;
```

Programming Hints

Use symbolic constants and variable names

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- Four suites of card club, heart, spade, diamond.
- Simply use C, H, S, D
- Avoid redundant code
 - use subroutine
- In long program, it may help to write key comments

Get to know the Editors

- Java & C++: Eclipse
 - http://www.eclipse.org/
- Pick one language and STICK with it.
- Know its graphical debuggers
- Know its shortcuts



Source Code Library

- APIs: Application Programming Interface
- Know useful libraries
 - ACMICPC 2013/fuch.pdf



Tip 5: Be master tester

Ultimately we want "Accepted (AC)" verdict.

- Test the given input
- Test incorrect input
- Test boundary conditions
- Test examples that you know of correct answer
- Test Big Examples if the data can be produced quickly



Tip 6: Practice

AND MORE PRACTICE



Know
Rules
Algorithms
Programming
English
Your Team



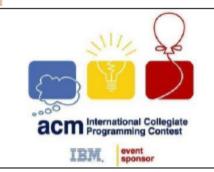
Reference

- Chua Hock-Chuan, "ICPC How to get start"
- Andrew Harrington, "Basic Strategy and Preparation: ACM Programming Team"
- Hao Fu, "Source code library for ACM/ICPC in C++"
- Skiena et al, "Programming Challenges: The Programming Contest Training Manual"
- Halim et al, "Competitive Programming"



English for Competitive Programming

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Problem E Jump

ACM-ICPC Asia Thailand National On-Site Programming Contest 2015







In ACM city, there are N tiles staying in two-dimensional Cartesian coordinate (x_i, y_i) . Each tile has a power bottle for boosting the jumping energy e_i .

You can jump only right or up direction. That is, you can jump from a tile (x_1, y_1) to a tile (x_2, y_2) only if $y_1=y_2$ and $x_1< x_2$ (right direction) or $x_1=x_2$ and $y_1< y_2$ (up direction).

Each time you jump, you have to loss your jumping energy B. You could not jump if your jumping energy is less than B and when you reach the new tile, you will get the power bottle for boosting your jumping energy e_i immediately.

You initially stay in the first tile and you initially have energy e_1 . Your mission is to jump from the first-tile to the N-th tile (the last tile) and also get the maximum energy. In this task, you can jump only from a tile to a tile. You cannot jump outside the tile.

Your task

Write a program to find the maximum energy to jump from the first tile to the N-th tile.

Input

The first line of the input contains an integer T, the number of test cases ($1 \le T \le 10$). Then T test cases follow in the format described below.

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The first line of each test case contains two positive integers N and B. ($2 \le N \le 300,000$; 1 $\le B \le 1,000$)

The next N lines describe each tile from the first tile to the N-th tile. Each line contains three integers x_i y_i e_i (0 <= x_i , y_i <= 100,000; 0 <= e_i <= 1,000)

Guarantee that no two tiles stay in the same coordinate and there is a way that you can jump from the first tile to the N-th tile.

Output

The output contains T lines show the maximum energy to jump from the first tile to the N-th tile.

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Example

Input	output
2	20
6 20	200
10 10 20	
15 10 20	
10 15 15	
15 20 20	
20 15 200	
20 20 20	
6 20	
10 10 20	
15 10 20	
10 15 20	
15 20 20	
20 15 200	
20 20 20	



Example Solution