Introduction to ACM-ICPC and CCPC

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Outline

- Introduction to ACM-ICPC and CCPC
- Selection Contest
- Practice and training

Introduction to ACM-ICPC and CCPC

What are they?

- ACM International Collegiate Programming Contest.
- Official site: https://icpc.baylor.edu/

- The Association for Computing Machinery (ACM) is an international learned society for computing. It is the world's largest scientific and educational computing society.

What are they?

- China Collegiate Programming Contest.
- Official site: https://ccpc.io/

- The 1st CCPC was held in 2015.

- HKU Team *GMT+7* ranked 5 in CCPC Final 2018

Basic rules

- Solve 10 to 14 programming tasks in 5 hours.
- 3 members per team.
- 1 computer.
- C++ or Java.

Question style

- Mathematically well-defined (No Ambiguities)
- Time/Memory limit.
- Data constraints.
- Input/Output specifications.

- No GUI, network knowledge etc. are needed.

http://poj.org/problem?id=1001

Exponentiation

Language: Default

Time Limit: 500MS **Memory Limit:** 10000K
Total Submissions: 194564 **Accepted:** 46622

Description

Problems involving the computation of exact values of very large magnitude and precision are common. For example, the computation of the national debt is a taxing experience for many computer systems.

This problem requires that you write a program to compute the exact value of R^n where R is a real number ($0.0 < R < 99.999$) and n is an integer such that $0 < n <= 25$.

Input

The input will consist of a set of pairs of values for R and n. The R value will occupy columns 1 through 6, and the n value will be in columns 8 and 9.

Output

The output will consist of one line for each line of input giving the exact value of R^n. Leading zeros should be suppressed in the output. Insignificant trailing zeros must not be printed. Don't print the decimal point if the result is an integer.

Sample Input

```
95.123 12
0.4321 20
5.1234 15
6.7592  9
98.999 10
1.0100 12
```

Sample Output

```
548815620517731830194541.899025343415715973535967221869852721
.000000051485546410769561219945112767671548384817602007263512038354297630134624043992025569.928573701266488041146654993318703707511666295476720493953024
29448126.764121021618164430206909037173276672
904290727436295404981075960194566517745610440100011.126825030131969720661201
```

How is it judged?

- Only source code is submitted and judged.
- Data-based judging. Your source code is compiled and run by the judge.
- The judge uses a preset dataset as input, and compare your output against the referenced answer.

How is it judged?

Your solution is judged as correct (**AC - Accepted**) only if

- it compiles successfully;
- it does not crash;
- the memory it requires is within memory limit;
- it terminates within the time limit;
- it outputs all the correct answers.

CE - Compile Error

RE - Runtime Error

MLE - Memory Limit Exceeded

TLE - Time Limit Exceeded

WA - Wrong Answer

Example

problems | submissions | questions | scoreboard | submit/print | docs | logout

Tue 28 Oct 2008 09:14:12
time left: 55:16
Auto refresh: 30s (toggle)

Submissions (team *deFAUlt*) show all teams

time	team	problem	lang	status	verified
2008-10-27 21:35:14	deFAUlt	C - Doors and Penguins	cpp	CORRECT	FINAL
2008-10-27 21:34:39	deFAUlt	C - Doors and Penguins	cpp	CORRECT	FINAL
2008-10-27 21:20:25	deFAUlt	C - Doors and Penguins	cpp	WRONG-ANSWER	FINAL
2008-10-27 21:15:46	deFAUlt	C - Doors and Penguins	cpp	WRONG-ANSWER	FINAL
2008-10-27 20:57:29	deFAUlt	F - Generic Units Converter	cpp	WRONG-ANSWER	PENDING
2008-10-27 20:56:54	deFAUlt	F - Generic Units Converter	cpp	WRONG-ANSWER	PENDING
2008-10-27 20:56:11	deFAUlt	F - Generic Units Converter	cpp	WRONG-ANSWER	PENDING
2008-10-27 20:41:35	deFAUlt	F - Generic Units Converter	cpp	WRONG-ANSWER	PENDING
2008-10-27 20:20:43	deFAUlt	F - Generic Units Converter	cpp	WRONG-ANSWER	PENDING
2008-10-27 19:59:21	deFAUlt	F - Generic Units Converter	cpp	TIMELIMIT	PENDING
2008-10-27 19:53:36	deFAUlt	F - Generic Units Converter	cpp	TIMELIMIT	PENDING
2008-10-27 19:16:59	deFAUlt	G - Zoned Out	cpp	CORRECT	FINAL
2008-10-27 18:55:31	deFAUlt	E - Marbles in Three Baskets	cpp	CORRECT	FINAL
2008-10-27 18:35:46	deFAUlt	D - Gypsy Moths	cpp	CORRECT	FINAL
2008-10-27 18:32:57	deFAUlt	D - Gypsy Moths	cpp	WRONG-ANSWER	FINAL
2008-10-27 18:07:20	deFAUlt	E - Marbles in Three Baskets	cpp	TIMELIMIT	FINAL
2008-10-27 17:27:50	deFAUlt	E - Marbles in Three Baskets	cpp	TIMELIMIT	FINAL
2008-10-27 16:54:31	deFAUlt	H - Shrew-ology	cpp	CORRECT	FINAL
2008-10-27 16:39:10	deFAUlt	A - Permutation Recovery	cpp	CORRECT	FINAL

PROBLEM	SCORE
A - Permutation Recovery	1 (19 + 0)
B - Crosswords Insider	0
C - Doors and Penguins	3 (314 + 40)
D - Gypsy Moths	2 (135 + 20)
E - Marbles in Three Baskets	3 (155 + 40)
F - Generic Units Converter	0
G - Zoned Out	1 (176 + 0)
H - Shrew-ology	1 (34 + 0)
Summary	6 / 933

http://2009.nwerc.eu/documentation/

How are teams ranked?

- Teams are firstly ranked according to the number of problems solved, then the total time used.
- The **total time** is the sum of the time consumed for each problem solved.
- The time consumed for a solved problem is the **time elapsed** from the beginning of the contest to the submittal of the first accepted run plus **20 penalty minutes** for every previously rejected run (Compile Error excluded) for that problem.

Example

- Suppose you have the following submissions:
  - The 12th minute, problem A, correct;
  - The 34th minute, problem B, incorrect;
  - The 56th minute, problem C, incorrect;
  - The 78th minute, problem B, correct;
  - The 90th minute, problem A, incorrect.
- Then your time consumed is 12 for problem A, 78 + 20 * 1 = 98 for problem B and 0 for problem C. Your total time is thus 110.
- Contestants can check ranks **in real time**.

A picture


0:35:09
#ICPC2015
So far, all accepted solutions for problem E use the easier but slower implementation that runs in n*log n time, said Michal Forisek.

Contest structure of ICPC

- University selection
  - We will select 3 team this year.
- Regional contests (Asia East Continent sub-region)
  - Our main battlefield.
- World finals
  - Top teams in regional contests advance to world finals. About 140 teams in total around the world.
  - Team "*Will Cyber college students fantasize about Cloud Classroom?*" advances to 45th ICPC World Final Dhaka held on November 6-11, 2022

Skills required

- Coding. Implement whatever algorithms you have in mind.
- Algorithm design.
  - Classic algorithms
    - Data Structures, e.g. Stack/Queue, (persistent) Segment Tree, Link-Cut Tree
    - Graph Algorithms, e.g. Shortest Path, Network Flow, Steiner Tree
    - String Algorithms, Number Theory Algorithms, Geometry Algorithms, etc.
  - Algorithm design techniques like divide-and-conquer, square root decomposition, dynamic programming, efficient search
- Programming and debugging onsite under pressure.

Upcoming contests

Contest plan

- We plan to select **3** teams.
- ICPC rules: each team can go to at most 2 regional contests
  - Depending on budget and results of online preliminary contests, each team will go to 1 or 2 contests
  - Jinan Regional (online / onsite*, Nov. 26-27, 2022)
  - Hangzhou Regional (online / onsite*, Dec. 3-4, 2022)
  - Nanjing Regional (online / onsite*, Dec. 17-18, 2022)
    - **If available**, 3 teams will participate remotely on one of these sites
  - Hong Kong Regional (**onsite**, Jan. 14-15, 2023)
    - 3 teams will go to Hong Kong Regional

* To Be Determined by corresponding competition committee

Selection Contest

- Planned on **October 7 (Fri), 7:00 pm – 9:30 pm**
  - Individual contest.
  - Rank by ICPC rules.
  - Printed/written notes are allowed.
  - Contest environment: **TBA** (Last year: PC^{2*})
- Selection:
  - WF 2022 team members (0 – 3 slots)
  - Contestants from selection contest (6 – 9 slots)
  - From above, 9 will be qualified to represent HKU in ICPC competitions
- Practice contest: **October 6 (Thu), 7:00 pm – 8:00 pm**
  - Not mandatory

Registration

Our Website

* Just for reference, this year may not be the same. For information of PC^2, please see https://pc2.ecs.csus.edu/

Practice and training

Being self-motivated

- You can start whenever you want
- You can quit whenever you want
- We assist you to participate in the contests, including organizing online training sessions.
- However, we do not and cannot force you to do anything.
- You have to be **self-motivated**.

Your benefits

- Opportunity to participate in ACM-ICPC and CCPC.
  - You can win good medals and take your proud photos!
- The department appoints a TA (Hao XIE) for you to consult, regarding the competition and solving programming problems.
- Experience helps in finding a good job in industry.
- Meet new friends that have the same interest with you.

Practice makes perfect

- Online judge
  - Codeforces: https://codeforces.com/
  - Atcoder: https://atcoder.jp/
  - TopCoder: https://www.topcoder.com/
  - Peking University Online Judge (many classic problems, some are a little bit outdated): http://poj.org/
- ACM-ICPC Live Archive (past contest problems): https://icpcarchive.ecs.baylor.edu/
- Etc.

- Virtual judge (DIY contests): https://vjudge.net/

Training plan – this semester

- We organize practice contests regularly, aiming for this year's regional contests
- **> Individual/Team Contest <**
- Distribute weekly via team email
- You are also encouraged to participate in the contest held by Codeforces, Atcoder, Topcoder

- If you are new, you can also find some resources in http://i.cs.hku.hk/~provinci/training.html

Consultation

- Send me an email if you have any questions about the contest, both technical and non-technical.
- Hao XIE, hxie@connect.hku.hk

- Appoint with me if you need face to face consultation.

- Our website: https://i.cs.hku.hk/~provinci/

Any questions?