MCTA028 – Programação Estruturada

Aula 02: Laboratório
- Funções e procedimentos
- Vetores e matrizes

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3Q-2018

Slides adaptados dos originais gentilmente fornecidos pelo Prof. Jesús P. Mena-Chalco

Hi, Francisco Fraga

HOME | PERFIL | NEWS 324 | ACADEMIC | CONTESTS | FÓRUM | PROBLEMAS | SUBMISSÕES | RANKS | SAIR

NOVOS

MEUS TÓPICOS

OCORRÊNCIAS

URI ONLINE JUDGE
PROBLEMS & CONTESTS

DASHBOARD

ESTE É O SEU DASHBOARD. AQUI VOCÊ ENCONTRARÁ ALGUMAS COISAS INTERESSANTES.

BARRA DE PESQUISA

1001, URI Online Judge, ad-hoc, ... | Problemas | BUSCAR

VOCÊ PODE RAPIDAMENTE BUSCAR POR PROBLEMAS, AUTORES, USUÁRIOS E UNIVERSIDADES. DIVIRTA-SE!

PROGRESSO	DIA	TENTADO	RESOLVIDO
00.05%	8	1	1

TOP 20

1. Maycon Alves
2. Gabriel Duarte
3. Luiz Joaquim
4. Gustavo Policarpo
5. Erick Leonardo de...
6. Gabriel Leonardo ...
7. Thalyson Nepomuceno
8. Sleeping
9. Luis Fernando Ver...
10. Mcheh (IUBAT)
11. Wyllian Brito
12. Diego Rangel

PROBLEMAS
Pesquise em nosso repositório, dividido em 8 categorias.
PESQUISAR

NOVOS
Os últimos problemas incluídos em nosso repositório em um só lugar!
PESQUISAR

RANK
Confira o rank principal do URI Online Judge.
VISUALIZAR

UNIVERSIDADES
Selecione sua Universidade e cheque o rank.
PESQUISAR

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forum
URI ONLINE JUDGE

FAÇA O TOUR
Veja as novidades do Fórum!

MEUS TÓPICOS
Veja seus tópicos.

FAQ
Respostas sobre o Forum!

PROBLEMAS
Veja todos os problemas

URI FORUM

O LUGAR CERTO PARA COMPARTILHAR CONHECIMENTO!

BARRA DE PESQUISA

1001, URI Online Judge, ad-hoc, ...

BUSCAR

INICIANTE
Problemas básicos para quem está iniciando na programação...
2694 TÓPICOS

AD-HOC
Problemas de Simulação, Datas e Ad-Hoc no geral...
729 TÓPICOS

STRINGS
Palindromos, Frequência, Ad-Hoc, LCS, Manipulação de Strings...
409 TÓPICOS

ESTRUTURAS E BIBLIOTECAS
Filas, Pilhas, Ordenação, Mapas...
306 TÓPICOS

MATEMÁTICA
Sistemas Numéricos, Número Primos, BigInteger...
375 TÓPICOS

PARADIGMAS
Programação Dinâmica, Busca Binária, Gulosos, Backtracking...
171 TÓPICOS

uDebug

Problems Contributors Sign In

Enjoy competitive programming? Great!

Engage with fellow-programmers and be part of a democratic culture!

12832 problems

8 judges

1 community

We are an enthusiastic community of competitive programmers who help each other out by answering questions on chat, providing hints and solutions to problems from several online judges, furnishing test input and sharing feedback. We do all this while having fun and fostering a sense of camaraderie!

Select a problem or browse problems

All Judges | Problem title or ID | Search

What Is uDebug?

On uDebug, you can select a problem you've coded up a solution for, provide input, and get the "accepted" output. You can then check to see if this output matches up with the output of your own program. If it does, great! Otherwise, this is an indication that something in your program needs to be fixed.

Why Choose uDebug?

Discuss issues with your code with other programmers on the chat.

Refer to hints shared by the community.

Debug your program with input contributed by other programmers. Vote on and select the best ones!

Test your program for several online judges including UVa Online

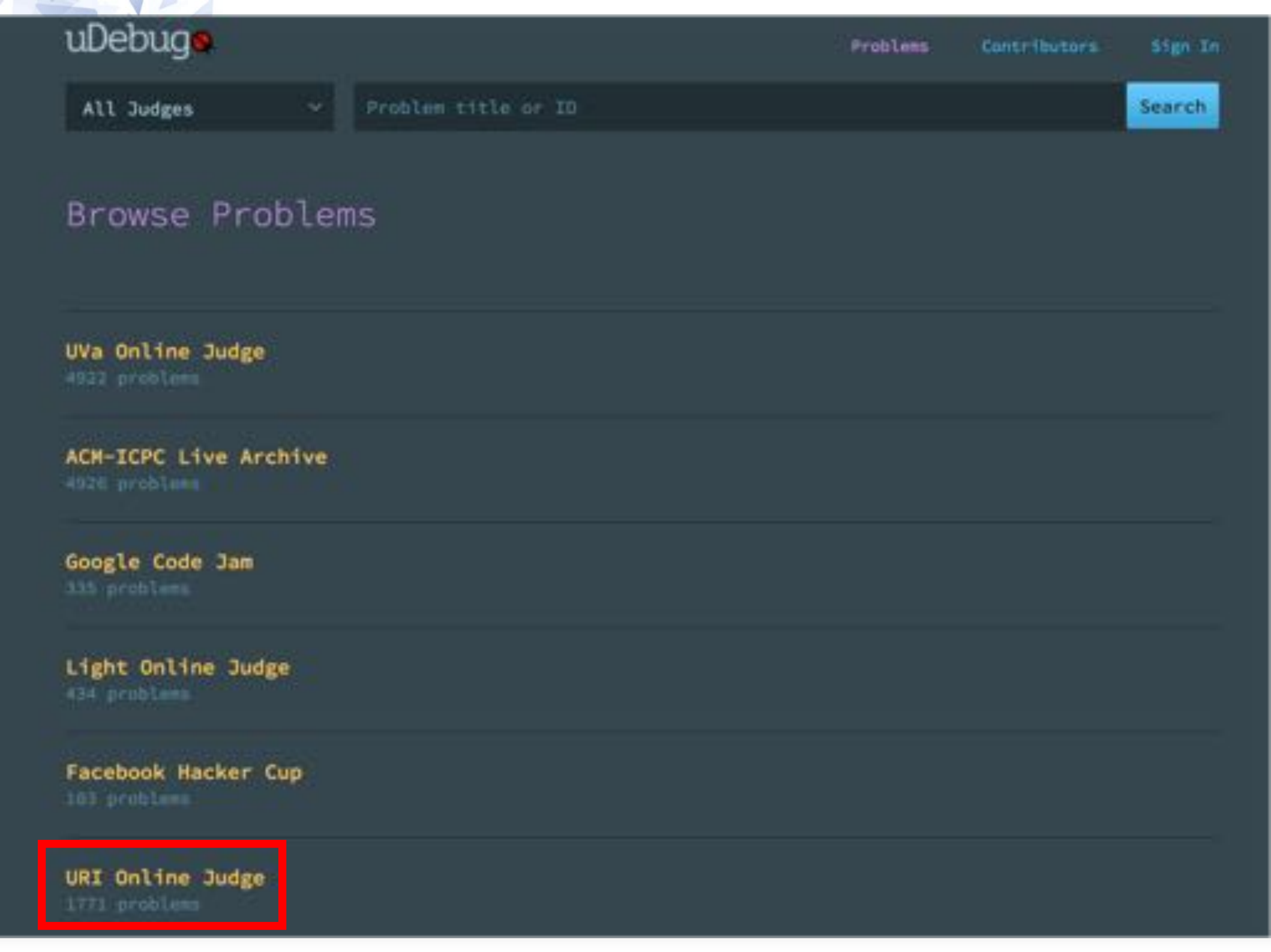
Who Loves uDebug?

uDebug is not only an amazing community for people learning programming and algorithms, it is also the perfect complement to UVa Online Judge. I have been waiting years for such a platform in order to fix faulty problem descriptions, correct wrong data sets and strengthen weak ones. In the case of ACM-ICPC Live Archive, it is now also possible to obtain data sets for problems that don't have any. Before uDebug this was merely wishful thinking! Now, this is a reality.

Professor Miguel Angel Revilla
Creator, Uva Online Judge, Spain

WITHOUT UDEBUG

FAQ API Terms Of Use Tweet 588 Like 978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Problem title or ID
Search
Browse Problems
UVa Online Judge
4922 problems
ACM-ICPC Live Archive
4926 problems
Google Code Jam
335 problems
Light Online Judge
434 problems
Facebook Hacker Cup
103 problems
URI Online Judge
1771 problems

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All Judges | Problem title or ID | Search

URI Online Judge

1 Beginner

2 Ad-Hoc

3 Strings

4 Data Structures and Libraries

5 Mathematics

6 Paradigms

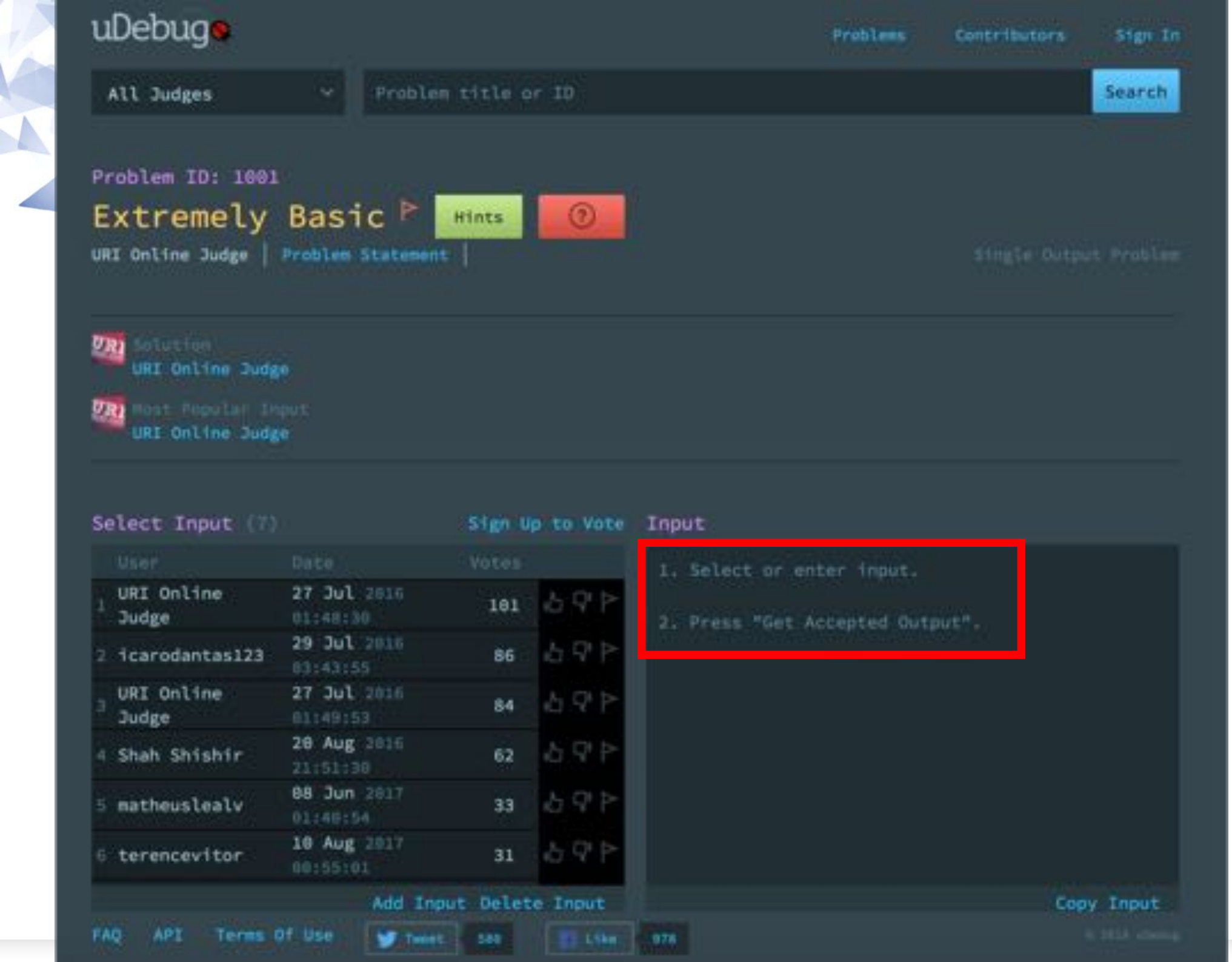
7 Graph

8 Computational Geometry

URI Online Judge

1 Beginner

Problem ID	Title	Solution by	Most Popular Input by
1001	Extremely Basic	URI Online Judge	URI Online Judge
1002	Area of a Circle	URI Online Judge	URI Online Judge
1003	Simple Sum	URI Online Judge	ajunior
1004	Simple Product	URI Online Judge	icarodantas123
1005	Average 1	URI Online Judge	ajunior
1006	Average 2	URI Online Judge	ajunior
1007	Difference	URI Online Judge	ajunior
1008	Salary	URI Online Judge	matheuscarius
1009	Salary With Bonus	URI Online Judge	froghramar
1010	Simple Calculate	URI Online Judge	froghramar
1011	Sphere	URI Online Judge	froghramar
1012	Area	URI Online Judge	froghramar


uDebug
Problems
Contributors
Sign In
All Judges
Problem title or ID
Search
Problem ID: 1001
Extremely Basic
Hints
URI Online Judge | Problem Statement |
Single Output Problem
Solution
URI Online Judge
Most Popular Input
URI Online Judge
Select Input (7)
Sign Up to Vote
Input
User
Date
Votes
1 URI Online Judge 27 Jul 2016 01:48:30 101
2 icarodantas123 29 Jul 2016 03:43:55 86
3 URI Online Judge 27 Jul 2016 01:49:53 84
4 Shah Shishir 20 Aug 2016 21:51:30 62
5 matheuslealv 08 Jun 2017 01:40:54 33
6 terencevitor 10 Aug 2017 00:55:01 31
1. Select or enter input.
2. Press "Get Accepted Output".
Add Input
Delete Input
Copy Input
FAQ
API
Terms Of Use
Tweet
580
Like
976

uDebug

Problems Contributors Sign In

Select Input (7) Sign Up to Vote

	User	Date	Votes
1	URI Online Judge	27 Jul 2016 01:48:30	101
2	icarodantas123	29 Jul 2016 03:43:55	86
3	URI Online Judge	27 Jul 2016 01:49:53	84
4	Shah Shishir	20 Aug 2016 21:51:30	62
5	matheuslealv	08 Jun 2017 01:40:54	33
6	terencevitor	10 Aug 2017 00:55:01	31

Add Input Delete Input

Input

```
78 89
98 76
-456 -1
```

Copy Input

Get Accepted Output

Accepted Output

Your Output

```
1. Run your code with the same input as above.

2. Paste your output here.

3. Press "Compare Outputs".
```

uDebug

Problems Contributors Sign In

Select Input (7) Sign Up to Vote

	User	Date	Votes
1	URI Online Judge	27 Jul 2016 01:48:30	101
2	icarodantas123	29 Jul 2016 03:43:55	86
3	URI Online Judge	27 Jul 2016 01:49:53	84
4	Shah Shishir	20 Aug 2016 21:51:30	62
5	matheuslealv	08 Jun 2017 01:40:54	33
6	terencevitor	10 Aug 2017 00:55:01	31

Add Input Delete Input

Input

```
78 89
98 76
-456 -1
```

Copy Input

Get Accepted Output

Accepted Output

```
X = 167
```

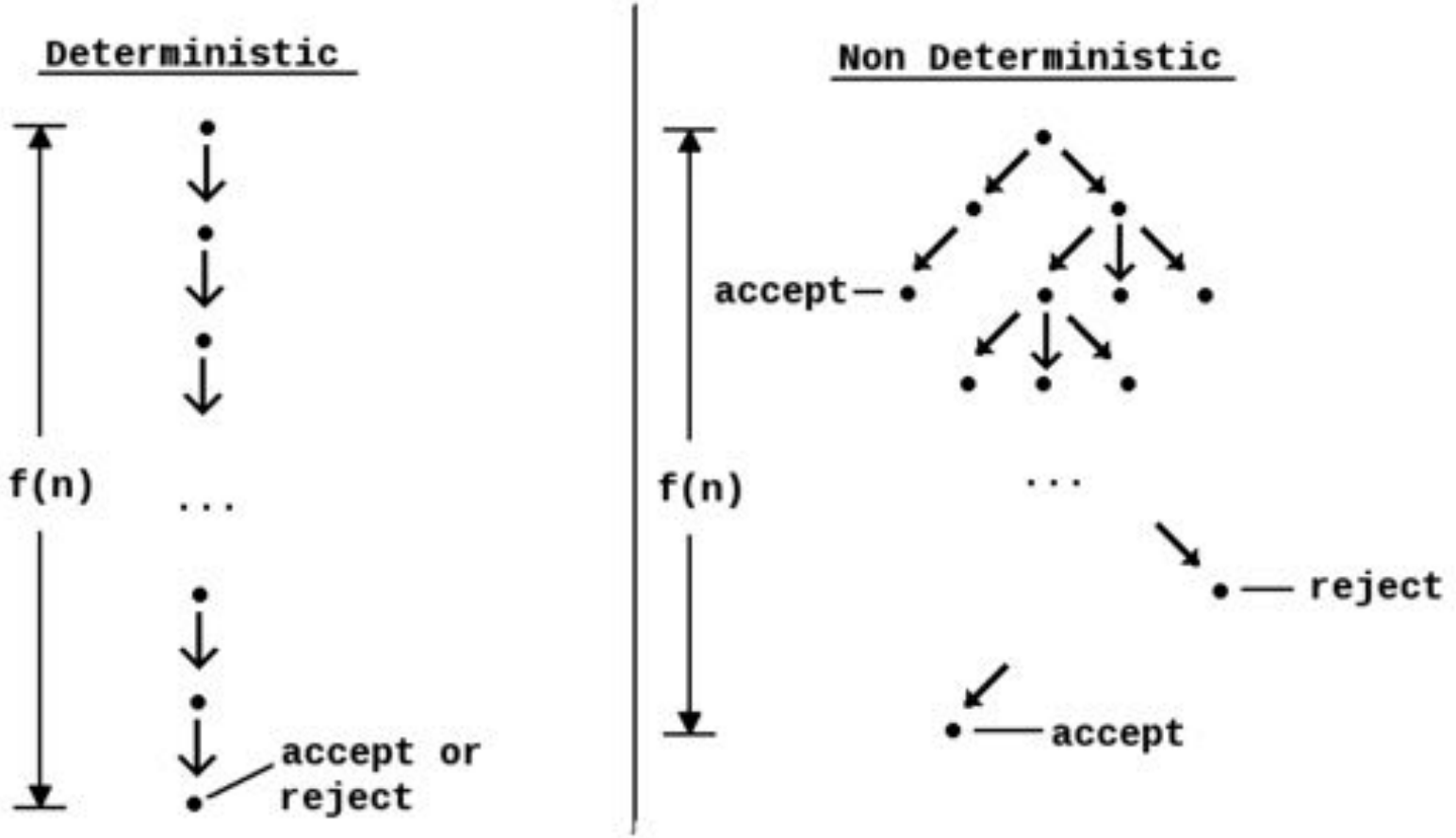
Your Output

1. Run your code with the same input as above.

2. Paste your output here.

3. Press "Compare Outputs".

Algoritmos:
Deterministicos Vs Não-deterministicos



Um programa **determinístico** sempre gera a mesma saída para o mesmo conjunto de entrada.

Um programa é **não-determinístico** quando apresenta resultados diferentes com os mesmos conjuntos de entrada.

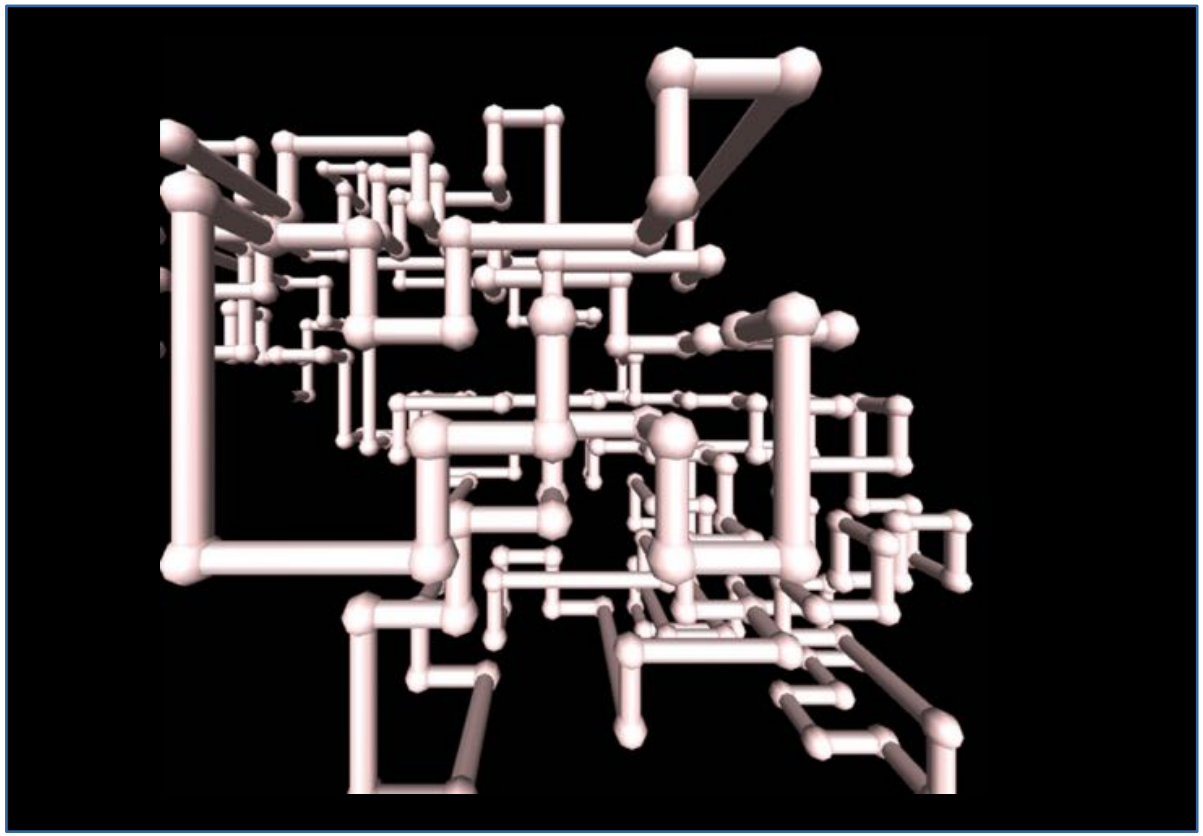
Procedimento: exemplo 1

```c
#include <stdio.h>
#include <stdlib.h>

void main () {
    int numero;

    numero = rand();
    printf("%d\n", numero);
}
```

`int rand(void)`
Devolve um número inteiro entre 0 e RAND_MAX

Números aletórios

Me da um número aleatório



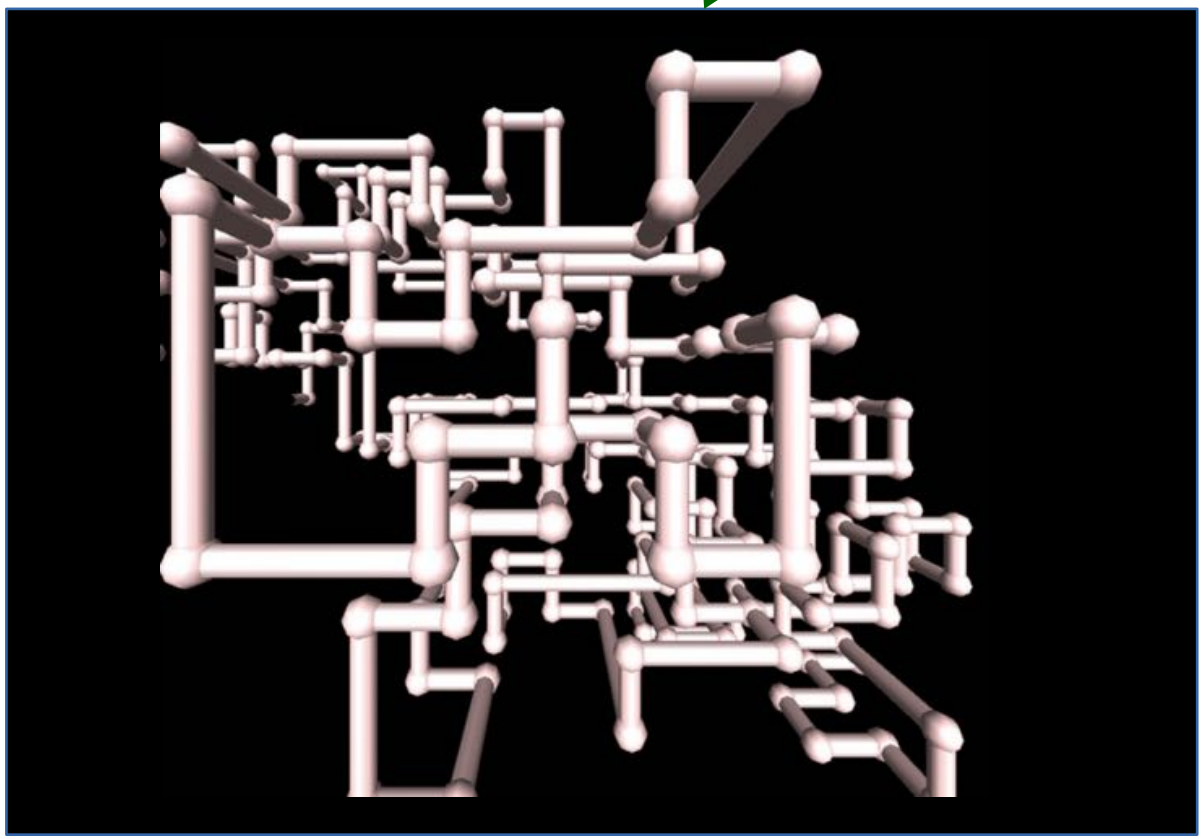
Pronto

stdlib.h

Números aletórios

Me da um número aleatório

Temperatura
Hora atual do sistema
Número de rotações do HD
...



Pronto

stdlib.h

Números aletórios

Home Games Numbers Lists & More Drawings Web Tools Statistics Testimonials Learn More Login

RANDOM.ORG

Search RANDOM.ORG

Search

True Random Number Service

Do you own an iOS or Android device? Check out our app!

Note: Our much improved new API is currently in public beta - learn more on api.random.org

HTTP Interface Description

RANDOM.ORG is a true random number service that generates randomness via atmospheric noise. This page explains how to interface to the service via the Hyper-Text Transfer Protocol (HTTP). There is also the HTTP Client Archive, which contains clients that other people have written.

Important note!

If you access RANDOM.ORG via an automated client, please make sure you observe the Guidelines for Automated Clients or your computer may be banned.

If you are writing a general-purpose client, please make sure it is easy for your users to run it in accordance with the guidelines.

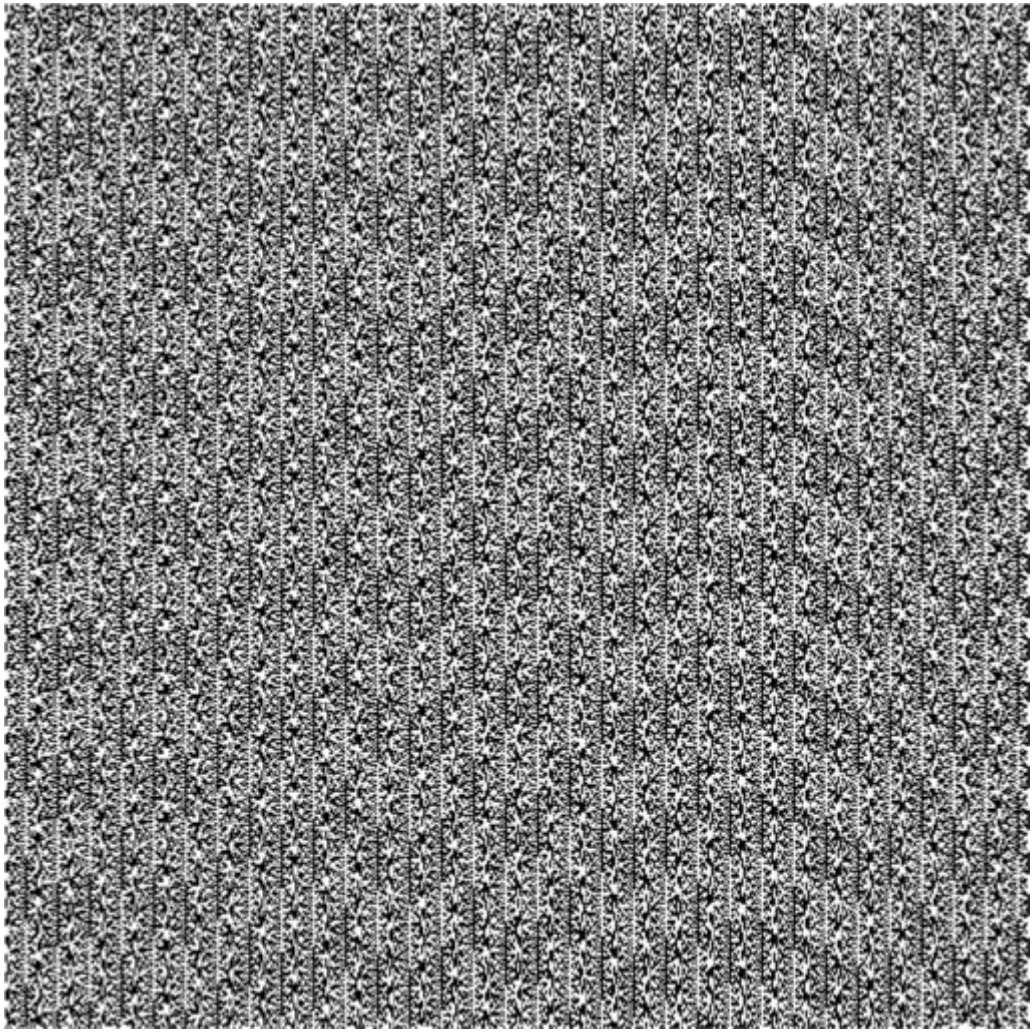
This page contains documentation for the Integer Generator, the Sequence Generator, the String Generator and the Quota Checker, which allows you to examine your current bit allowance.

All the interfaces on this page return HTTP status code 503 (Service Unavailable) in the case of errors and code 200 (OK) when successful. Not all languages allow you to access the HTTP status codes in a straightforward manner. A reasonable workaround is to look for the string "Error:" (don't forget the colon) as the first line of the response. This will work for all the generators on this page, including the String Generator (which could by chance produce the string "Error" in a successful response, but which cannot produce the colon character).

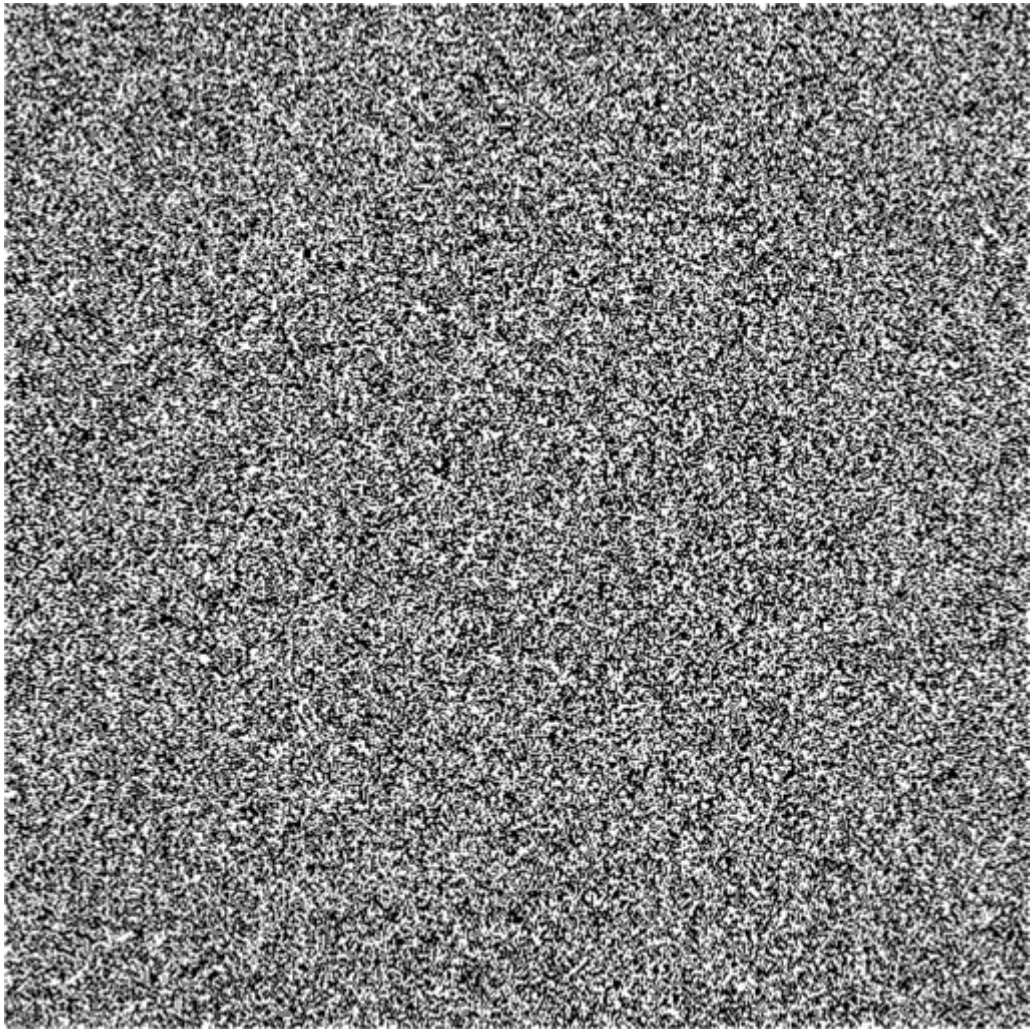
Please note that the old CGI scripts (randbyte, randnum, etc.) are no longer supported and you should use the ones described below instead. In particular, the old scripts do not return the 503 status code in case of errors (they return the 200 response code in all cases), so please use the new ones instead.

Números aletórios

Pseudo-random



True-random



https://boallen.com/random-numbers.html

Procedimento: exemplo 1

```c
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

void main () {
    int numero;

    srand(time(NULL));

    numero = rand();
    printf("%d\n", numero);
}
```

`int rand(void)`
Devolve um número inteiro entre 0 e RAND_MAX

```c
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

void main () {
    int numero;

    srand(time(NULL));

    numero = rand()%17;
    printf("%d\n", numero);
}
```

```c
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

void main () {
    int numero;

    srand(time(NULL));

    numero = rand()%17;
    printf("%d\n", RAND_MAX)
}
```

Procedimento: exemplo 2

```c
#include <stdio.h>
#include <stdlib.h>

void linha(int n) {
    int i;
    int posicao = rand()%n;

    for (i=0; i<n; i++)
        if (posicao==i)
            printf("-");
        else
            printf("*");
    printf("\n");
}

void main() {
    linha(10);
    linha(10);
}
```

`int rand(void)`
Devolve um número inteiro entre 0 e RAND_MAX

```
******-***
******-***
```

Procedimento: exemplo

```c
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

void linha(int n) {
    int i;
    int posicao = rand()%n;

    for (i=0; i<n; i++)
        if (posicao==i)
            printf("-");
        else
            printf("*");
    printf("\n");
}

void main() {
    srand(time(NULL));
    linha(10);
    linha(10);
}
```

```
****-*****
******-***
```

https://www.tutorialspoint.com/c_standard_library/c_function_srand.htm

Procedimento: exemplo

Modifique o programa para que sejam apresentadas consecutivamente os pares de linhas desde que o elemento selecionado em cada linha seja diferente.

Isto é, o programa deve parar quando as duas linhas sejam iguais.

Quantas pares de linhas foram apresentadas?

```
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <time.h>
4
5  void linha(int n) {
6      int i;
7      int posicao = rand()%n;
8
9      for (i=0; i<n; i++)
10         if (posicao==i)
11             printf("-");
12         else
13             printf("*");
14     printf("\n");
15 }
16
17 void main() {
18     srand(time(NULL));
19     linha(10);
20     linha(10);
21 }
```

Procedimento: exemplo

Modifique o programa para que sejam apresentadas consecutivamente os pares de linhas desde que o elemento selecionado em cada linha seja diferente.

Isto é, o programa deve parar quando as duas linhas sejam iguais.

Quantas pares de linhas foram apresentadas?

```
1  #include <stdio.h>
2  #include <stdlib.h>
3  #include <time.h>
4
5  int linha(int n) {
6      int i;
7      int posicao = rand()%n;
8
9      for (i=0; i<n; i++)
10         if (posicao==i)
11             printf("-");
12         else
13             printf("*");
14     printf("\n");
15     return posicao;
16 }
17
18 int linhas() {
19     int l1, l2, cont=0;
20
21     do {
22         l1 = linha(10);
23         l2 = linha(10);
24         cont++;
25     } while (l1!=l2);
26
27     return cont;
28 }
29
30 void main() {
31     srand(time(NULL));
32     printf("%d\n", linhas());
33 }
```

PI: John Wallis

Crie um programa para calcular o valor de PI seguindo a Identidade de John Wallis (1655). Considere como parâmetro o número de termos na produtoria.

$$\prod_{n=1}^{\infty}\left(\frac{2n}{2n-1}\cdot\frac{2n}{2n+1}\right)=\frac{2}{1}\cdot\frac{2}{3}\cdot\frac{4}{3}\cdot\frac{4}{5}\cdot\frac{6}{5}\cdot\frac{6}{7}\cdot\frac{8}{7}\cdot\frac{8}{9}\cdots=\frac{\pi}{2}$$

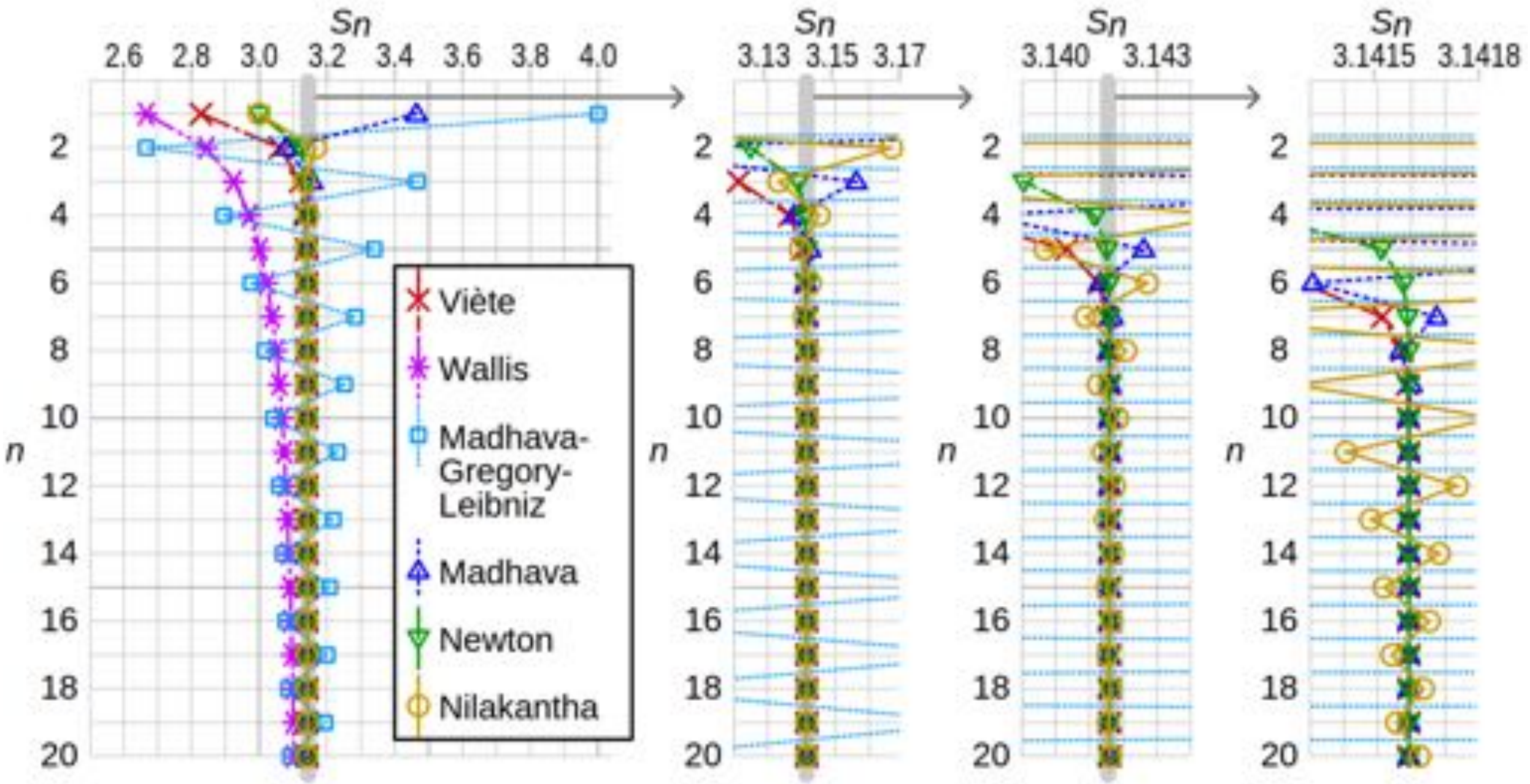
```c
#include <stdio.h>

double pi(int t) {



}

void main() {
    printf("%lf\n", pi(1));
    printf("%lf\n", pi(10));
    printf("%lf\n", pi(100));
    printf("%lf\n", pi(1000));
}
```

PI: John Wallis

$$\prod_{n=1}^{\infty}\left(\frac{2n}{2n-1}\cdot\frac{2n}{2n+1}\right)=\frac{2}{1}\cdot\frac{2}{3}\cdot\frac{4}{3}\cdot\frac{4}{5}\cdot\frac{6}{5}\cdot\frac{6}{7}\cdot\frac{8}{7}\cdot\frac{8}{9}\cdots=\frac{\pi}{2}$$

```c
#include <stdio.h>

double pi(int t) {
    int i;
    double produto = 1;

    for (i=1; i<=t; i++)
        produto *= (4.0*i*i)/((2*i-1)*(2*i+1));

    return produto*2;
}

void main() {
    printf("%lf\n", pi(1));
    printf("%lf\n", pi(10));
    printf("%lf\n", pi(100));
    printf("%lf\n", pi(1000));
}
```

Aproximação de pi



Lista da Aula 2 - Deadline: 10/10/2018 (23h50)

Usaremos a Plataforma URI para a avaliação da lista:
https://www.urionlinejudge.com.br

Vetores

1. Problema 1172. Substituição em Vetor I
2. Problema 1174. Seleção em Vetor I
3. Problema 1178. Preenchimento de Vetor III

Matrizes

4. Problema 1181. Linha na Matriz
5. Problema 1182. Coluna na Matriz
6. Problema 1184. Abaixo da Diagonal Principal
7. Problema 1190. Área Direita

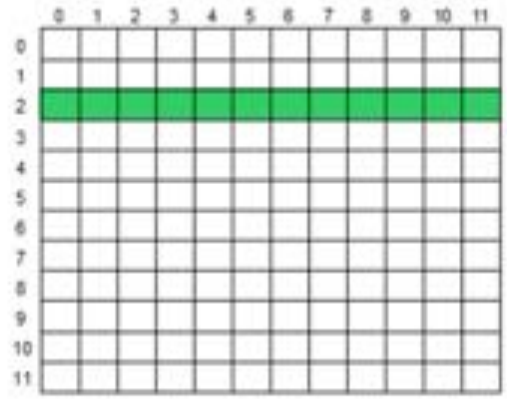
URI Online Judge | 1161

Linha na Matriz

Por Neilor Tonin, URI Brasil

Timelimit: 1

Neste problema você deve ler um número, indicando uma linha da matriz na qual uma operação deve ser realizada, um caractere maiúsculo, indicando a operação que será realizada, e todos os elementos de uma matriz **M**[12][12]. Em seguida, calcule e mostre a soma ou a média dos elementos que estão na área verde da matriz, conforme for o caso. A imagem abaixo ilustra o caso da entrada do valor 2 para a linha da matriz, demonstrando os elementos que deverão ser considerados na operação.



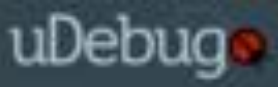
Entrada

A primeira linha de entrada contem um número **L** (0 ≤ **L** ≤ 11) indicando a linha que será considerada para operação. A segunda linha de entrada contém um único caractere Maiúsculo **T** ('S' ou 'M'), indicando a operação (Soma ou Média) que deverá ser realizada com os elementos da matriz. Seguem os 144 valores de ponto flutuante que compõem a matriz, sendo que a mesma é preenchida linha por linha, da linha 0 até a linha 11, sempre da esquerda para a direita.

Saída

Imprima o resultado solicitado (a soma ou média), com 1 casa após o ponto decimal.

Exemplo de Entrada	Exemplo de Saída
2 S 0.0 -3.5 2.5 4.1 ...	12.6



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All Judges Problem title or ID Search

Problem ID: 1181

Line in Array

Hints

URI Online Judge | Problem Statement |

Single Output Problem

URI Solution
URI Online Judge

Most Popular Input
mfgmateus

Select Input (5) Sign Up to Vote Input

	User	Date	Votes
1	mfgmateus	28 Aug 2016 21:09:43	11
2	mfgmateus	28 Aug 2016 21:10:18	9
3	bitfreeze	19 Oct 2016 14:48:27	8
4	Shah Shishir	20 Mar 2017 15:37:34	1
5	JoaoMoita	07 Jul 2018 16:42:27	0

1. Select or enter input.

2. Press "Get Accepted Output".

uDebug

Problems Contributors Sign In

mfgmateus

Select Input (5) Sign Up to Vote

	User	Date	Votes
1	mfgmateus	28 Aug 2016 21:09:43	11
2	mfgmateus	28 Aug 2016 21:10:10	9
3	bitfreeze	19 Oct 2016 14:48:27	8
4	Shah Shishir	20 Mar 2017 15:37:34	1
5	JoaoMoita	07 Jul 2018 16:42:27	0

Add Input Delete Input

Input

```
1
5
23
-8
-93
46
84
-94
-56
-88
20
-15
```

Copy Input

Get Accepted Output

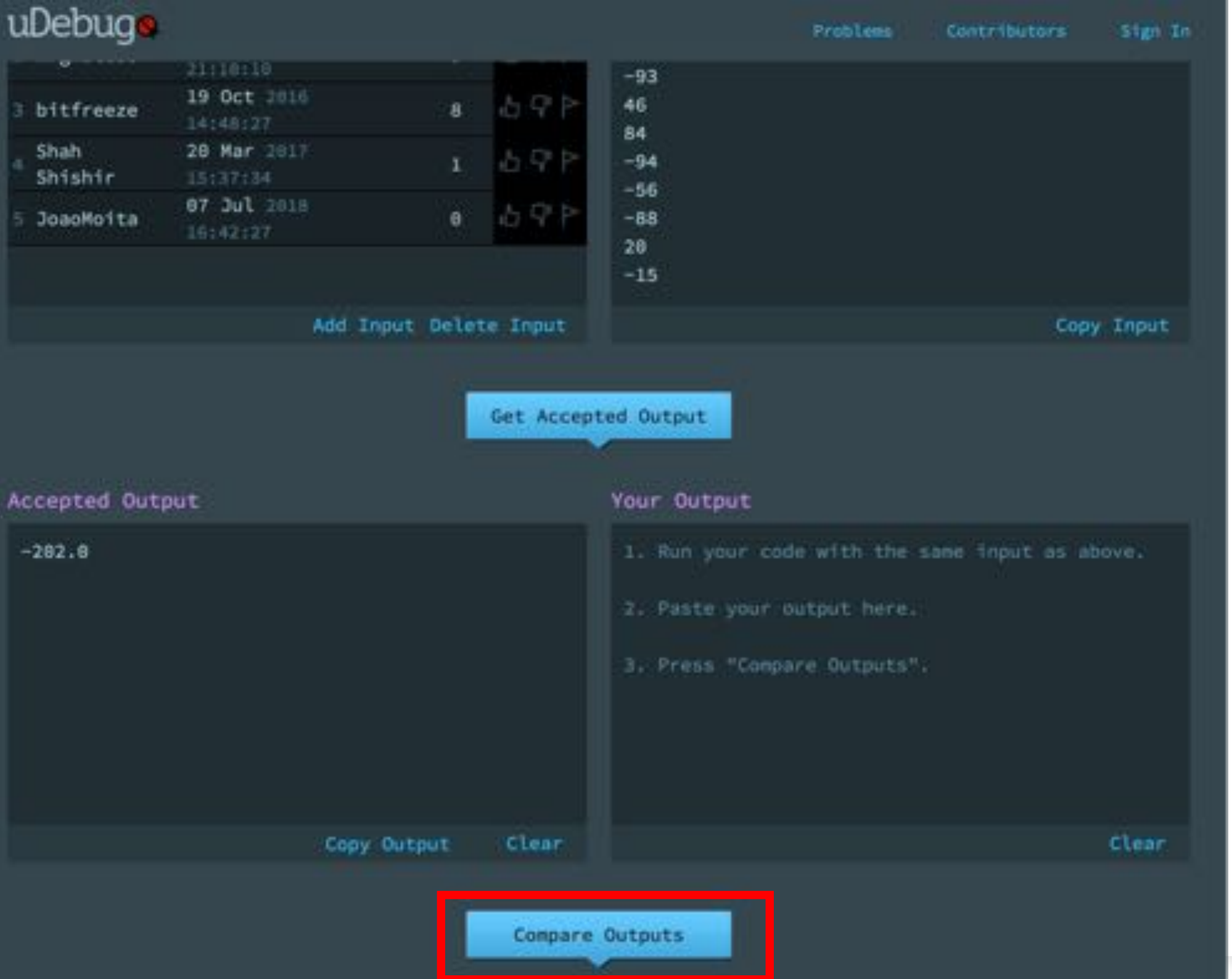
Accepted Output

Your Output

1. Run your code with the same input as above.

2. Paste your output here.

3. Press "Compare Outputs".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Problems
Contributors
Sign In
21:10:10
3 bitfreeze 19 Oct 2016 14:48:27 8
4 Shah Shishir 20 Mar 2017 15:37:34 1
5 JoaoMoita 07 Jul 2018 16:42:27 0
Add Input
Delete Input
-93
46
84
-94
-56
-88
20
-15
Copy Input
Get Accepted Output
Accepted Output
-282.0
Copy Output
Clear
Your Output
1. Run your code with the same input as above.
2. Paste your output here.
3. Press "Compare Outputs".
Clear
Compare Outputs

1181.c

```c
#include <stdio.h>

int main() {

    int linha, i, j;
    double m[12][12], soma = 0.0;
    char operacao;
    scanf("%d %c", &linha, &operacao);
    for (i = 0; i < 12; i++){
        for (j = 0; j < 12; j++){
            scanf("%lf", &m[i][j]);
            if (linha == i)
                soma += m[i][j];
        }
    }

    if (operacao == 'S')
        printf("%.1lf\n", soma);
    else if (operacao == 'M')
        printf("%.1lf\n", soma/12.0);

    return 0;
}
```

Exemplo de solução para o **Problema 1181** (Linha na Matriz).