

GB21802 - Programming Challenges

Week 0 - Introduction

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What is this course about?

Course Goal

Improve programming abilities and familiarity with algorithms and techniques.

Course Method

Every week you have to solve many hard, difficult [Programming Challenges](#)

In short: Learn by Practice!

Important Notice: Languages

This course uses both English and Japanese. This year we will try the following division:

Japanese

- Friday's Classes (Problem Review)
- Questions (Any classes)
- Mail Communication

English

- Monday Classes (Algorithm Review)
- Lecture Notes

Programming Language for Assignments

C, C++, Java and Pascal

Important Notice 2: This document

This presentation is available online on the MANABA page:

`https://manaba.tsukuba.ac.jp/ct/course_427760`

You can register to the course using the code:

1962775

Outline

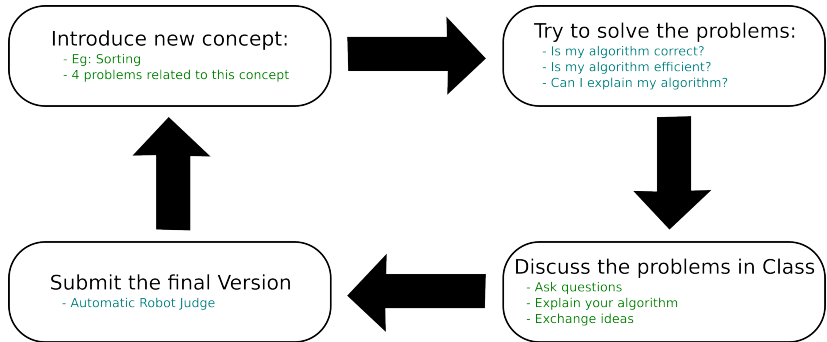
Two classes per week

- Each week has a theme (see Manaba Syllabus)
- Monday Class: Theme Explanation ([English](#))
- Friday Class: Problem Solving and Q&A ([Japanese](#))

Solving Problems

- Every week there are four programming assignments;
- Assignments follow the weekly theme;
- Automatic Submission and Evaluation System;
- Deadline is Sunday 23:59

Outline



What are programming challenges?

Short (but sometimes hard) problem involving algorithms

Components

- Problem Outline
- Example Data
- Example Result
- Hidden Data
- Judge Result

Start with an integer n . If n is even, divide by 2. If n is odd, multiply by 3 and add 1.

Repeat this process with the new value of n , terminating when $n = 1$. For example:

22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1

In the example above, the cycle length of 22 is 16. Given any two numbers i and j , you are to determine the maximum cycle length over all numbers between i and j , including both endpoints.

What are programming challenges?

Short (but sometimes hard) problem involving algorithms

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Input

The input will consist of a series of pairs of integers i and j , one pair of integers per line. All integers will be less than 1,000,000 and greater than 0.

Output

For each pair of input integers i and j , output i , j in the same order in which they appeared in the input and then the maximum cycle length for integers between and including i and j .

What are programming challenges?

Short (but sometimes hard) problem involving algorithms

Components

- Problem Outline
- **Example Data**
- **Example Result**
- Hidden Data
- Judge Result

Sample Input

```
1 10
100 200
201 210
900 1000
```

Sample Output

```
1 10 20
100 200 125
201 210 89
900 1000 174
```

What are programming challenges?

Short (but sometimes hard) problem involving algorithms

Components

- Problem Outline
- Example Data
- Example Result
- **Hidden Data**
- Judge Result

Sample Input

```
1 10
100 200
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Sample Output

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1 10 20
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What are programming challenges?

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Components

- Problem Outline
- Example Data
- Example Result
- Hidden Data
- **Judge Result**

Accepted
Rejected
Time Limited Exceeded (TLE)

Evaluation and Grading (1)

Evaluation Criteria: **Problems solved** and **Participation**

Evaluation Base

- **C**: One problem per class;
- **B**: Two problems per class,
or One problem per class and 21 problems total;
- **A**: Three problems per class,
or One problem per class and 30 problems total;

Evaluation and Grading (2)

A **Bonus** or **Penalty** will be added to the base grade.

- Bonus: Change grade one step up (C->B, A->A+)
- Penalty: Change grade one step down (A+->A, B->C, C->C)

Bonus: Grade Up

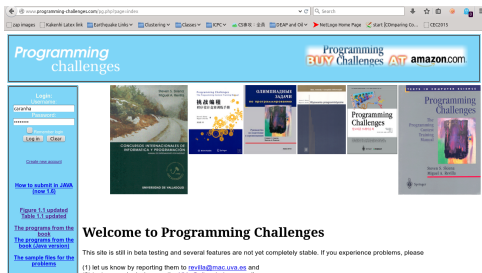
Good participation in class and good Comments in code.

Penalty: Grade Down

More than 8 late problems.

How to submit problems – 1

Problem submission and evaluation will be done through the *Programming Challenges* website.



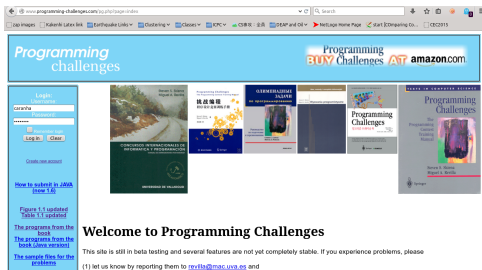
Access it at

<http://www.programming-challenges.com/>

How to submit problems – 2

- 1 Make an account at
`http://www.programming-challenges.com;`
- 2 Send your ID to me:
 - Manaba Form
or
 - e-mail (`caranha@cs.tsukuba.ac.jp`)
send your student number, name and ID
- 3 You will be added to the classroom
Tsukuba Programming Challenges 2015;

How to submit problems – 3



- 4 Click “Joined Classrooms”, select Tsukuba Programming Challenges 2015;
- 5 Click the name of the problem for a description, then “Submit” to send your code.
- 6 Choose the language; upload a file or paste your code.

How to submit problems – 4

Some notes about writing programs:

Input and Output

Input comes from the **STDIN**, output comes from the **STDOUT**.

Good Comment

```
/**  
 * I used quicksort to solve this problem.  
 * I sorted the age of the persons in the input.  
 * To make it faster, people with the same age were  
 * removed from the data.  
 */
```

Bad Comment

```
/**  
 * Quicksort.  
 */
```

How to submit problems – 5

A warning about Java

- Very high number of runtime problems – beware!
- Main class MUST be named “Main”
- Read the example code at:
`http://www.programming-challenges.com/pg.php?page=javainfo`

How the Judge Works

Accepted

Congratulations!

Wrong Answer

- Is your answer EXACTLY the same as expected?
- Check worst-case scenarios!

Time Limited Exceeded

You need a more efficient algorithm.

Compilation Error, Runtime Error

Check your Code!

Very Important!

The assignments are **individual**. Use your own strength to solve the programs.

- Do not copy solutions from the internet;
- Do not copy solutions from your friends;
- It is okay to use for ideas from others or online;
- If you use an idea from someone else, **make sure to give proper attribution** in the program comments

Plagiarism leads to course failure

Useful Links

- **Manaba:**

`https://manaba.tsukuba.ac.jp/ct/course_427760`

Manaba Code: 1962775

- **Lecture Notes:** `https://github.com/caranha/`

`ProgrammingChallengesLectureNotes`

Feel free to fork/pull!

- **Professor Page:**

`http://conclave.cs.tsukuba.ac.jp/?page_id=128`

Lecture notes and Announcements (please use manaba)

- **Submission System:**

`http://www.programming-challenges.com/pg.php?page=showclassroom&classid=1474`

Reference Books

- "Programming Challenges", Steven S. Skiena, Miguel A. Revilla
- "Competitive Programming"
- "Ant Book"

(I will add more information in manaba page later)

Contact Information

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- **twitter:** caranha

Feel free to contact me in English or Japanese!