

# ji-1. Javaプログラミング入門 : 基本的なプログラム構造と 開発環境の活用

(Java プログラミング入門)

URL: <https://www.kkaneko.jp/pro/ji/index.html>



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# 目標



- コンピュータを役に立つ道具として実感する
- Java のsin 関数の繰り返し計算の**プログラム**を使い、キーボードからのデータの読み込み、計算の繰り返し、画面表示ができることを確認する
- GDBonline での Java プログラムの編集、実行

## ソースコード

```
import java.lang.Math;
import java.util.Scanner;

public class Main
{
    public static void main(String[] args) {
        double start_x, step_x, x, y;
        int i;
        Scanner s = new Scanner(System.in);
        System.out.println("Please Enter start_x =");
        start_x = s.nextDouble();
        System.out.println("Please Enter step_x =");
        step_x = s.nextDouble();
        for (i = 1; i <= 20; i++) {
            x = start_x + (i * step_x);
            y = Math.sin(x);
            System.out.printf("sin(%8.3f) = %8.3f¥n", x, y);
        }
    }
}
```

## ソースコード

```
import java.lang.Math;
import java.util.Scanner;
public class Main
{
    public static void main(String[] args) {
        double start_x, step_x, x, y;
        int i;
        Scanner s = new Scanner(System.in);
        System.out.println("Please Enter start_x =");
        start_x = s.nextDouble();
        System.out.println("Please Enter step_x =");
        step_x = s.nextDouble();
        for (i = 1; i <= 20; i++) {
            x = start_x + (i * step_x);
            y = Math.sin(x);
            System.out.printf("sin(%8.3f) = %8.3f¥n", x, y);
        }
    }
}
```

キーボードからの  
データの読み込み

計算の繰り返し

画面表示

# 例題 1 のプログラム実行結果



```
Main.java
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void main(String[] args) {
6         double start_x, step_x, x, y;
7         int i;
8         Scanner s = new Scanner(System.in);
9         System.out.println("Please Enter start_x =");
10        start_x = s.nextDouble();
11        System.out.println("Please Enter step_x =");
12        step_x = s.nextDouble();
13        for (i = 1; i <= 20; i++) {
14            x = start_x + (i * step_x);
15            y = Math.sin(x);
16            System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
17        }
18    }
19 }
20
```

input

```
Please Enter start_x =
0.4
Please Enter step_x =
0.1
sin( 0.500) = 0.479
sin( 0.600) = 0.565
sin( 0.700) = 0.644
sin( 0.800) = 0.717
sin( 0.900) = 0.783
sin( 1.000) = 0.841
sin( 1.100) = 0.891
sin( 1.200) = 0.932
sin( 1.300) = 0.964
sin( 1.400) = 0.985
sin( 1.500) = 0.997
sin( 1.600) = 1.000
sin( 1.700) = 0.992
sin( 1.800) = 0.974
sin( 1.900) = 0.946
sin( 2.000) = 0.909
sin( 2.100) = 0.863
sin( 2.200) = 0.808
sin( 2.300) = 0.746
sin( 2.400) = 0.675

...Program finished with exit code 0
Press ENTER to exit console.
```

キーボードから、データ「0.4」と「0.1」を読み込んでいる

計算を 20回繰り返して、計算結果を表示している

# プログラムの機能



プログラムでは, 計算等の実行手順を記述

- キーボードからのデータの読み込み

```
start_x = s.nextDouble();
```

```
step_x = s.nextDouble();
```

- 計算の繰り返し

計算は自動で繰り返し

```
for (i = 1; i <= 20; i++) {  
    x = start_x + (i * step_x);  
    y = Math.sin(x);  
    System.out.printf("sin(%8.3f) = %8.3f\n", x, y);  
}
```

- 画面表示

```
System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
```

- プログラミングを行えるオンラインのサービス

<https://www.onlinegdb.com>

- ウェブブラウザを使う

- たくさんの言語を扱うことができる

Python3, Java, C/C++, C#, JavaScript,  
R, アセンブリ言語, SQL など

- オンラインなので、「秘密にしたいプログラム」  
を扱うには十分な注意が必要

# Online GDB で Java を動かす手順



① ウェブブラウザを起動する

② 次の URL を開く

<https://www.onlinegdb.com>

A screenshot of a search bar with a magnifying glass icon on the left. The text "https://www.onlinegdb.com" is entered into the search field. The search bar is set against a light gray background.

🔍 <https://www.onlinegdb.com>

### ③ 「Language」 のところで, 「Java」 を選ぶ

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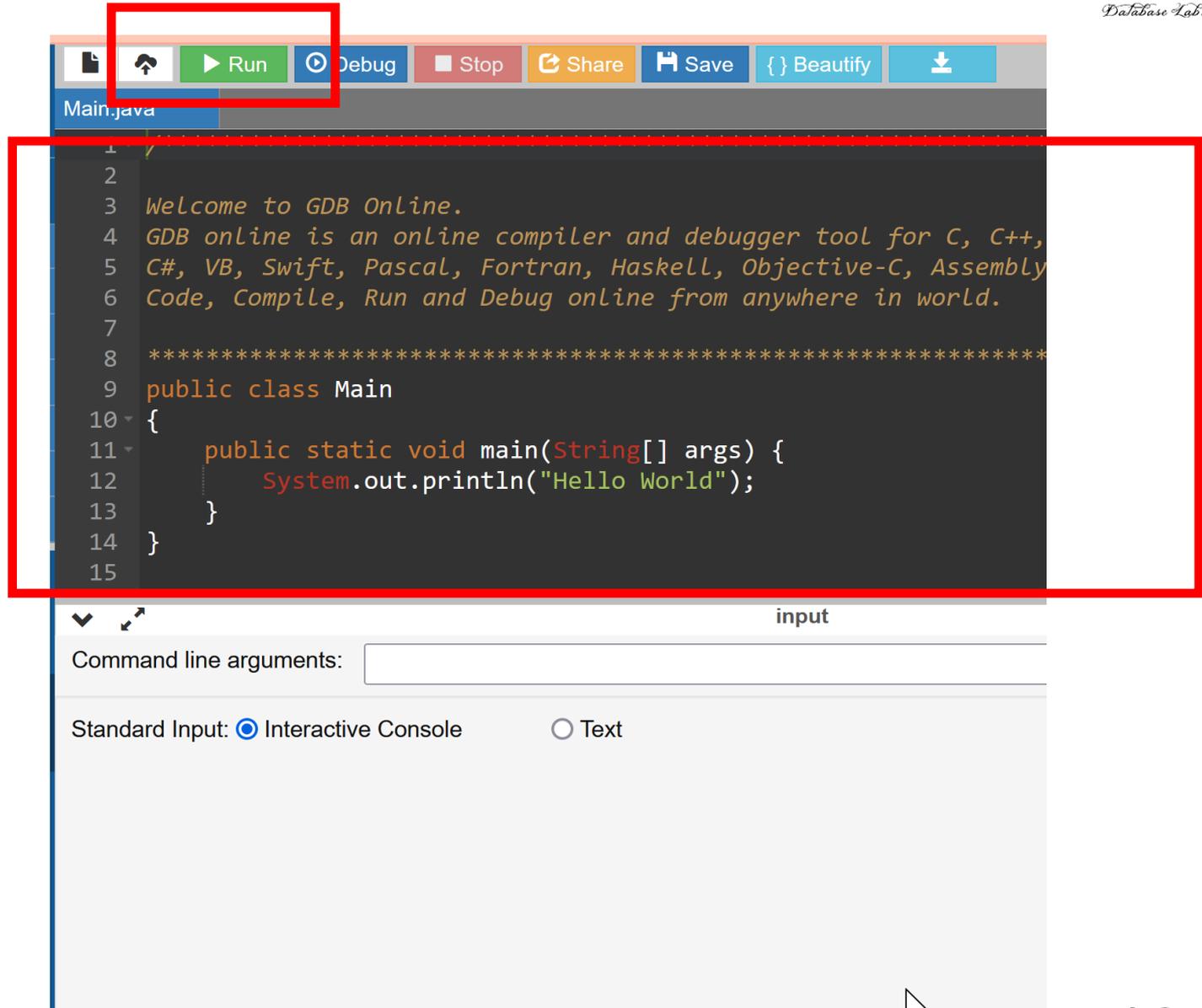
Run Debug Stop Share Save Beautify

Language -- select --

```
1 /*****  
2  
3 Welcome to GDB Online.  
4 GDB online is an online compiler and debugger tool for C, C++, Python  
5 C#, VB, Perl, Swift, Prolog, Javascript, Pascal, HTML, CSS, JS  
6 Code, Compile, Run and Debug online from anywhere in world.  
7  
8 *****/  
9 #include <stdio.h>  
10  
11 int main()  
12 {  
13     printf("Hello World");  
14  
15     return 0;  
16 }  
17
```

- select --
- C
- C++
- C++ 14
- C++ 17
- Java**
- Python 3
- PHP
- C#
- VB
- HTML,JS,CSS
- Ruby
- Perl
- Pascal
- R
- Fortran
- Haskell
- Assembly(GCC)
- Objective C
- SQLite

# 実行ボタン



The screenshot shows an online IDE interface. At the top, there is a toolbar with several buttons: Run (green), Debug (blue), Stop (red), Share (orange), Save (blue), Beautify (light blue), and a download icon (blue). The 'Run' button is highlighted with a red box. Below the toolbar, the code editor shows a Java program named 'Main.java'. The code is as follows:

```
1 //
2
3 Welcome to GDB Online.
4 GDB online is an online compiler and debugger tool for C, C++,
5 C#, VB, Swift, Pascal, Fortran, Haskell, Objective-C, Assembly
6 Code, Compile, Run and Debug online from anywhere in world.
7
8 *****
9 public class Main
10 {
11     public static void main(String[] args) {
12         System.out.println("Hello World");
13     }
14 }
15
```

Below the code editor, there is a console area. The console title is 'input'. It has a text input field for 'Command line arguments:' and a radio button selection for 'Standard Input:'. The 'Interactive Console' option is selected.

エディタ画面

プログラムを  
書き換えること  
ができる

# 実行手順 (1/4)



「Run」をクリック

```
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public Main(String args) {
6
7
8         Scanner s = new Scanner(System.in);
9         System.out.println("Please Enter start_x =");
10        start_x = s.nextDouble();
11        System.out.println("Please Enter step_x =");
12        step_x = s.nextDouble();
13        for (i = 1; i <= 20; i++) {
14            x = start_x + (i * step_x);
15            y = Math.sin(x);
16            System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
17        }
18    }
19 }
```

# 実行手順 (2/4)



```
Main.java
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void main(String[] args) {
6         double start_x, step_x, x, y;
7         int i;
8         Scanner s = new Scanner(System.in);
9         System.out.println("Please Enter start_x =");
10        start_x = s.nextDouble();
11        System.out.println("Please Enter step_x =");
12        step_x = s.nextDouble();
13        for (i = 1; i <= 20; i++) {
14            x = start_x + (i * step_x);
15            y = Math.sin(x);
16            System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
17        }
18    }
19 }
20
```

input

```
Please Enter start_x =

```

実行画面が現れる

# 実行手順 (3/4)



```
Main.java
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void main(String[] args) {
6         Scanner scanner = new Scanner(System.in);
7         System.out.println("Please Enter start_x =");
8         double start_x = scanner.nextDouble();
9         System.out.println("Please Enter step_x =");
10        double step_x = scanner.nextDouble();
11        for (int i = 1; i <= 20; i++) {
12            double x = start_x + (i * step_x);
13            double y = Math.sin(x);
14            System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
15        }
16    }
17 }
18 }
19 }
20 }
```

数值を入れる  
(プログラムに数値データを与える)

```
input
Please Enter start_x =
0.4
Please Enter step_x =
```

# 実行手順 (4/4)



```
Main.java
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void main(String[] args) {
6         double start_x, step_x, x, y;
7         int i;
8         Scanner s = new Scanner(System.in);
9         System.out.println("Please Enter start_x =");
10        start_x = s.nextDouble();
11        System.out.println("Please Enter step_x =");
12        step_x = s.nextDouble();
13        for (i = 1; i <= 20; i++)
14            x = start_x + (i * step_x);
15            y = Math.sin(x);
16            System.out.printf("sin( %.3f ) = %.3f\n", x, y);
17        }
18    }
19 }
```

input

```
Please Enter start_x =
0.4
Please Enter step_x =
0.1
sin( 0.500 ) = 0.479
sin( 0.600 ) = 0.565
sin( 0.700 ) = 0.644
sin( 0.800 ) = 0.717
sin( 0.900 ) = 0.783
sin( 1.000 ) = 0.841
sin( 1.100 ) = 0.891
sin( 1.200 ) = 0.932
sin( 1.300 ) = 0.964
sin( 1.400 ) = 0.985
sin( 1.500 ) = 0.997
sin( 1.600 ) = 1.000
sin( 1.700 ) = 0.992
sin( 1.800 ) = 0.974
sin( 1.900 ) = 0.946
sin( 2.000 ) = 0.909
sin( 2.100 ) = 0.863
sin( 2.200 ) = 0.808
sin( 2.300 ) = 0.746
sin( 2.400 ) = 0.675
```

さらに数値を入れると、  
計算結果が表示される

# 実行途中での強制終了

A screenshot of an IDE window titled 'Main.java'. The top toolbar contains buttons for Run, Debug, Stop, Share, Save, Beautify, and a download icon. The 'Stop' button is highlighted with a red box, and a red arrow points from it to a white box with a red border containing the text '「Stop」をクリック'. The code in the editor is a Java program that imports java.lang.Math and java.util.Scanner, defines a Main class with a main method, and prompts the user to enter start\_x and step\_x. The console output shows the prompts and the user's input '0.4'.

```
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void main(String[] args) {
6         double start_x, step_x, x, y;
7         int i;
8         Scanner s = new Scanner(System.in);
9         System.out.println("Please Enter start_x =");
10
11
12
13
14
15
16         System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
17     }
18 }
19 }
20
```

「Stop」をクリック

input

Please Enter start\_x =  
0.4  
Please Enter step\_x =  
□

# オンライン開発環境を使わずに Java プログラムを動かす手順 (参考のため)



- ① Java のインストール
- ② プログラムファイルの作成

```
import java.lang.Math;
import java.util.Scanner;
public class Main
{
    public static void main(String[] args) {
        double start_x, step_x, x, y;
        int i;
        Scanner s = new Scanner(System.in);
        System.out.println("Please Enter start_x =");
        start_x = s.nextDouble();
        System.out.println("Please Enter step_x =");
        step_x = s.nextDouble();
        for (i = 1; i <= 20; i++) {
            x = start_x + (i * step_x);
            y = Math.cos(x);
            System.out.printf("cos(%8.3f) = %8.3f\n", x, y);
        }
    }
}
```

Main.java のようなファイル名で保存

- ③ javac コマンドの実行

```
>javac Main.java
```

- ④ java コマンドの実行

```
>java Main
```

```
F:\>java Main
Please Enter start_x =
0.4
Please Enter step_x =
0.1
cos( 0.500) = 0.878
cos( 0.600) = 0.825
cos( 0.700) = 0.765
cos( 0.800) = 0.697
cos( 0.900) = 0.622
cos( 1.000) = 0.540
cos( 1.100) = 0.454
cos( 1.200) = 0.362
cos( 1.300) = 0.267
cos( 1.400) = 0.170
cos( 1.500) = 0.071
cos( 1.600) = -0.029
cos( 1.700) = -0.129
cos( 1.800) = -0.227
cos( 1.900) = -0.323
cos( 2.000) = -0.416
cos( 2.100) = -0.505
cos( 2.200) = -0.589
cos( 2.300) = -0.666
cos( 2.400) = -0.737
```

# 演習 1



例題 1 のプログラムを実行して,  $\sin(0.4)$  の値を確認しなさい

そのために `start_x`, `step_x` の値を適切に入れることを考えなさい.

```
sin( 0.400) = 0.389
```

# 演習 2



例題 1 のプログラムの「sin」の部分を、わざと間違えて（「son」のように）、「Run」をクリック。コンピュータによるプログラムの構文チェックの機能が有効に働いていることを確認しなさい

```
Main.java
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void main(String[] args) {
6         double start_x, step_x, x, y;
7         int i;
8         Scanner s = new Scanner(System.in);
9         System.out.println("Please Enter start_x =");
10        start_x = s.nextDouble();
11        System.out.println("Please Enter step_x =");
12        step_x = s.nextDouble();
13        for (i = 1; i <= 20; i++) {
14            x = start_x + (i * step_x);
15            y = Math.son(x);
16            System.out.printf("sin(%8.3f) = %8.3f\n", x, y);
17        }
18    }
19 }
20
```

input stderr

Compilation failed due to following error(s).

```
Main.java:15: error: cannot find symbol
    y = Math.son(x);
              ^
symbol:   method son(double)
location: class Math
1 error
```

## 演習 3



プログラムを **cos の値を計算**できるように書き換えて, 実行をしなさい.

```
y = Math.cos(x);  
System.out.printf("cos(%8.3f) = %8.3f\n", x, y);
```

そして,  $\cos(0.4)$  の値を確認しなさい.

```
cos (    0.400) =    0.921
```