



# ji-1. Java を使ってみる

(Java プログラミング入門)

URL: <https://www.kkaneko.jp/cc/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

# GDBonline 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 web browser's address bar. The address bar is a light gray rectangle with a thin border. On the left side, there is a magnifying glass icon. To the right of the icon, the text "https://www.onlinegdb.com" is displayed in a light gray font. Below the address bar, there is a thin horizontal line, and below that, a larger, light gray rectangular area representing the page content.





### ③ 「Language」 のところで、「Java」 を選ぶ

The screenshot shows the GDB Online web interface. At the top, there is a navigation bar with buttons for Run, Debug, Stop, Share, Save, Beautify, and a Language dropdown menu. The Language dropdown is open, showing a list of programming languages. The 'Java' option is highlighted in blue. The main area of the interface is a code editor with a dark background, displaying C code for a 'Hello World' program. 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++, 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
```



## 実行ボタン

```
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
```

input

Command line arguments:

Standard Input:  Interactive Console  Text

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)



The screenshot shows an IDE window with a toolbar at the top. The 'Run' button, represented by a green play icon, is highlighted with a red rectangular box. A red arrow points from this box to the text '「Run」をクリック' (Click 'Run') which is also enclosed in a red box. Below the text box, the Java code for a class named 'Main' is visible. The code imports 'java.lang.Math' and 'java.util.Scanner', and contains a loop that calculates the sine of a value 'x' for 20 iterations, printing the result.

```
1 import java.lang.Math;
2 import java.util.Scanner;
3 public class Main
4 {
5     public static void 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 }
```

数値を入れる  
(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(
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 }
```

さらに数値を入れると、  
計算結果が表示される

```
inout
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
```



# 実行途中での強制終了



```
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
```

```
C:\>java Main
Please Enter start_x =
1.4
Please Enter step_x =
0.1
cos( 0.500) =  0.878
cos( 0.600) =  0.825
cos( 0.700) =  0.764
cos( 0.800) =  0.697
cos( 0.900) =  0.622
cos( 1.000) =  0.540
cos( 1.100) =  0.454
cos( 1.200) =  0.364
cos( 1.300) =  0.267
cos( 1.400) =  0.173
cos( 1.500) =  0.071
cos( 1.600) = -0.039
cos( 1.700) = -0.129
cos( 1.800) = -0.221
cos( 1.900) = -0.323
cos( 2.000) = -0.416
cos( 2.100) = -0.509
cos( 2.200) = -0.588
cos( 2.300) = -0.666
cos( 2.400) = -0.721
```



# 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」の部分で、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 }
```

input

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
```