

JAVA

기본 프로그래밍 01

Objective

What is Programming?

- Procedural Programming(PP) vs Object-Oriented Programming(OOP)
- Features of Java

Development Environment

- Set up the development environment with JDK and Eclipse(IDE) on PC
- Print “Hello World” and Try some basic functions
- Write comments on source code
- Try compiling Java source code on the web

What is Programming?

Computer Programming(=Coding)

- ▶ The process of designing and building an executable computer program to accomplish a specific computing result or to perform a specific task

Q1 : What is a computer program?

Q2 : What does a computer consist of, then?

Q3 : How do we communicate with computers?

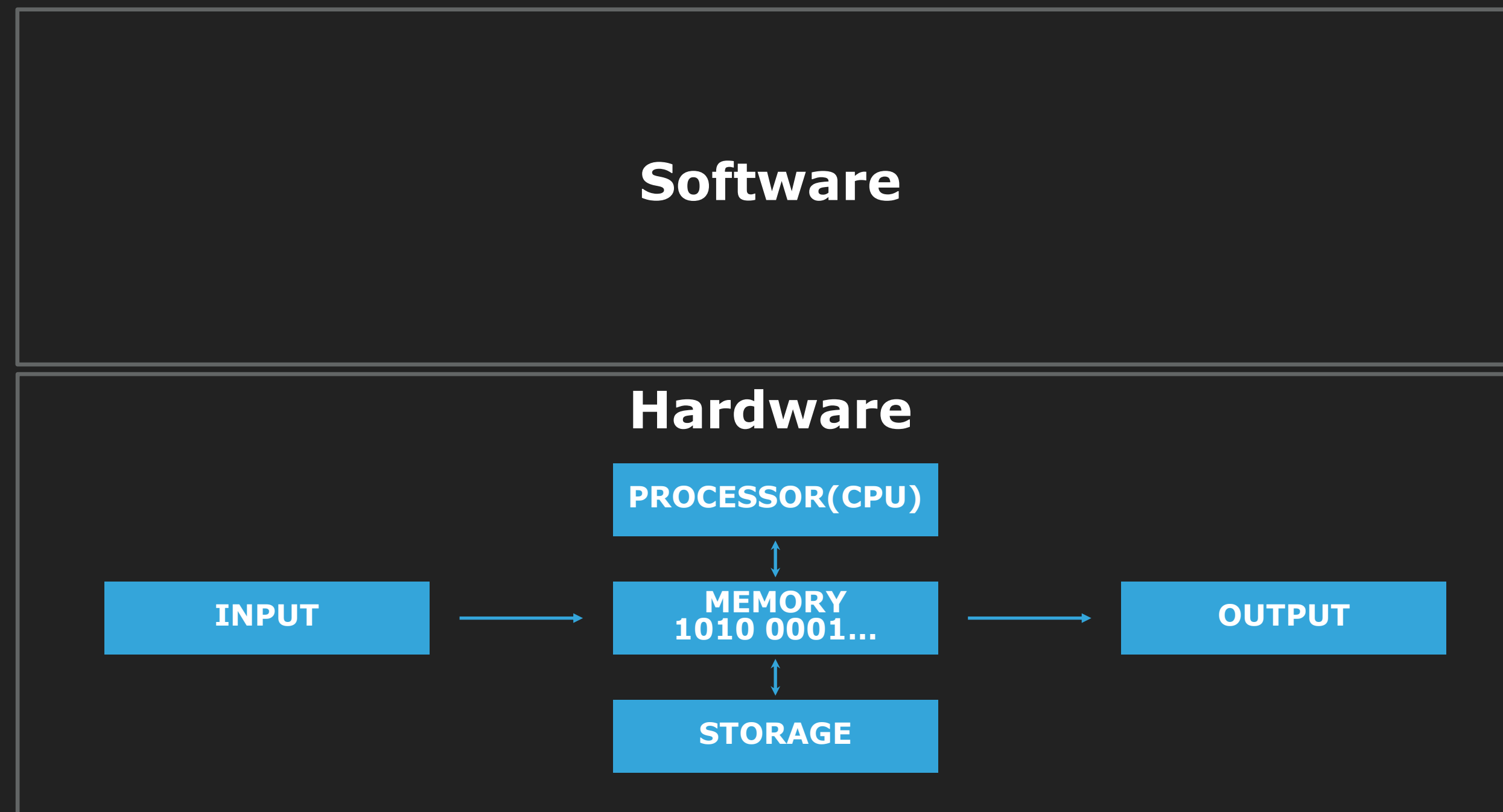
Answers to Q1 and Q2

Computer program

- ▶ A collection of instruction that can be executed by a computer to perform a specific task.

Hardware(HW) and Software(SW)

- ▶ Every computer is composed of two basic components: hardware and software



Answer to Q3

Software Category

- ▶ Application : a program designed to end-users
- ▶ Frameworks : a platform for developing software applications
- ▶ Firmware : a program to operate a device's hardware

Application
Frameworks
Firmware(System software)

Bitwise Operator

Bitwise Operation

- Operates on a bit string, a bit array or a binary numeral at the level of its individual bits.

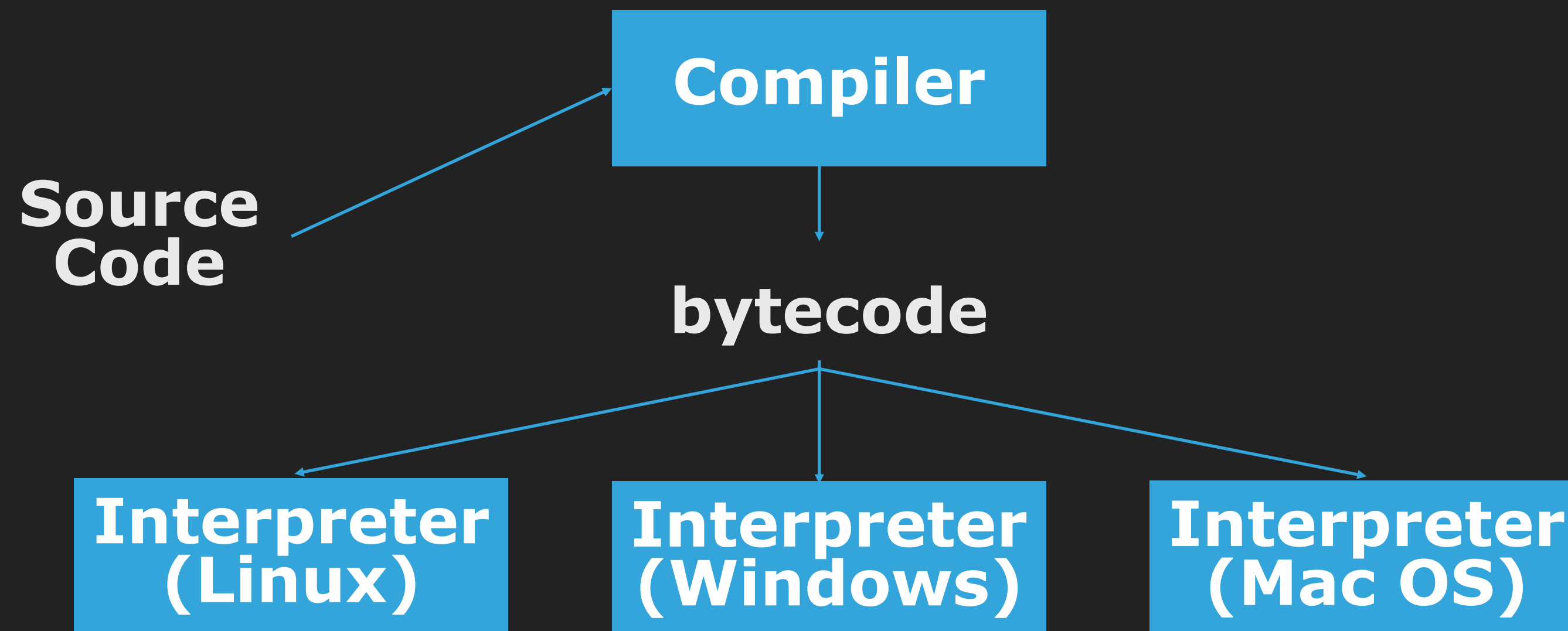
Q4* : Why are bits used for computer?

Q5* : What are units of measure for digital information used by computer?

Programming Process

Programming Process for Java

- ▶ Human composes source code
- ▶ Compiler translates code in human languages into one in programming lan



Q6* : What is bytecode?

Q7* : What's the role of JVM(Java Virtual Machine)?

Preparation of Development Environment(Cont'd)

Install JDK(Java Development Kit)

- ▶ A development environment for building applications and components using Java programming language.

- 1) Visit www.java.com
- 2) Download the file and install it

Click on it

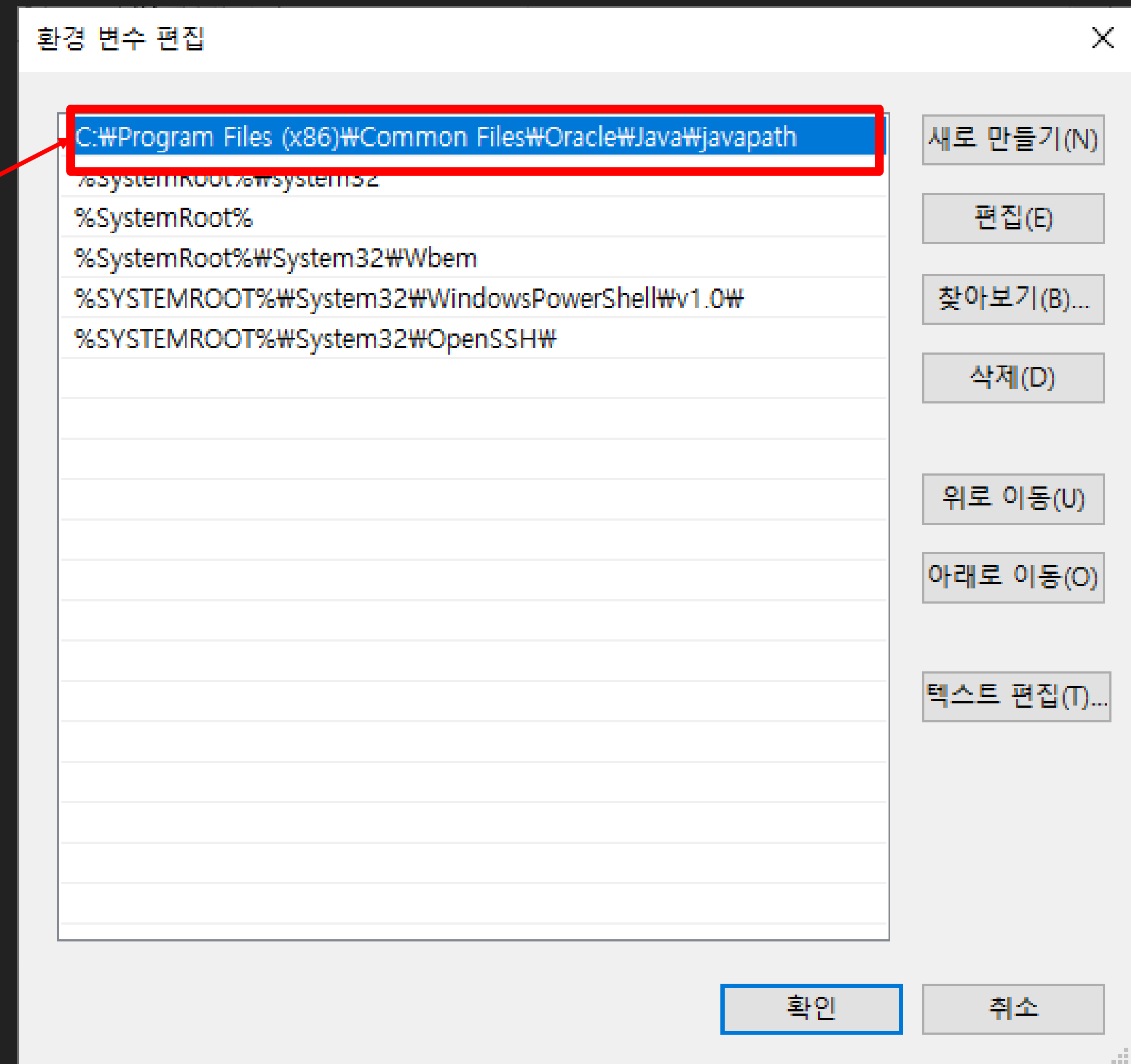


Preparation of Development Environment(Cont'd)

Install JDK(Java Development Kit)

- 3) After the installation,
the environment variables should include the path for Java

Path for Java installed



Preparation of Development Environment(Cont'd)

Install IDE(Integrated Development Environment)

► A software application that provides facilities for software development.

- 1) Visit www.eclipse.org
- 2) Download the file and install it

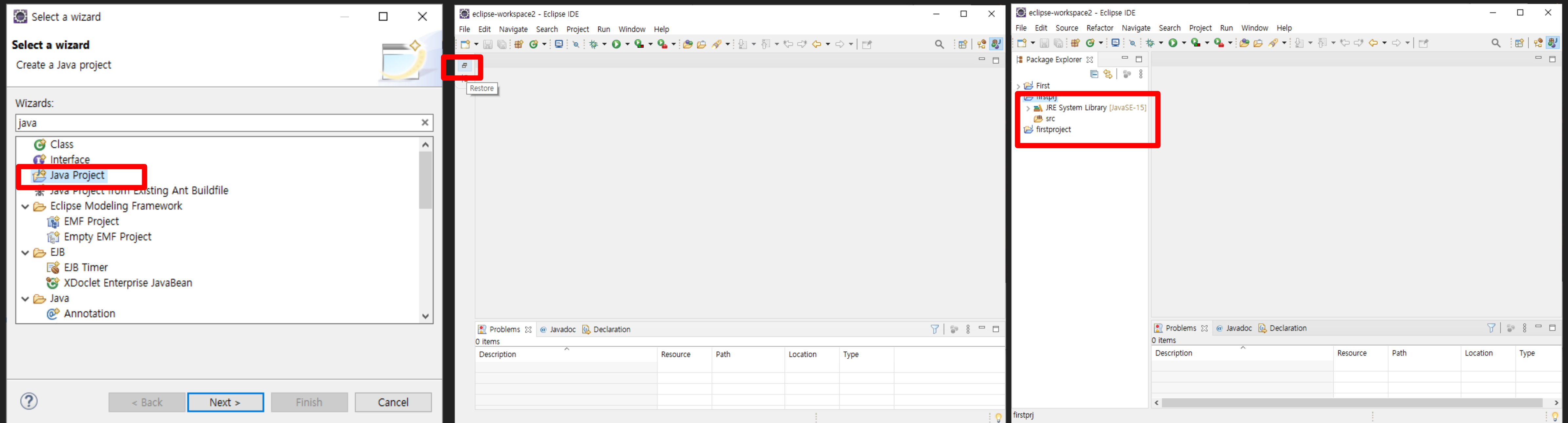
Click on it



Beginning of Programming(Cont'd)

Create a Java Project

- 1) New > Other > Java Project
- 2) Input a Project Name > Next > Finish



Beginning of Programming(Cont'd)

Create a Java Main Class

- 1) New > Other > Class
- 2) Input a Class Name > Check “public static void main” > Finish

The 'New Java Class' dialog is shown with the following fields and options:

- Source folder: firstprj/src
- Package: firstprj
- Enclosing type: (empty)
- Name: Main (highlighted with a red box)
- Modifiers: ☒ public, ☐ package, ☐ private, ☐ protected, ☐ abstract, ☐ final, ☐ static
- Superclass: java.lang.Object
- Interfaces: (empty)
- Which method stubs would you like to create?
 - ☒ public static void main(String[] args) (highlighted with a red box)
 - ☐ Constructors from superclass
 - ☒ Inherited abstract methods
- Do you want to add comments? (Configure templates and default value [here](#))
 - ☐ Generate comments

Buttons at the bottom: < Back, Next >, Finish (highlighted with a blue box), Cancel.

The Eclipse IDE window shows the 'Main.java' file with the following code:

```
1 package firstprj;  
2  
3 public class Main {  
4  
5     public static void main(String[] args) {  
6         // TODO Auto-generated method stub  
7     }  
8  
9 }  
10  
11
```

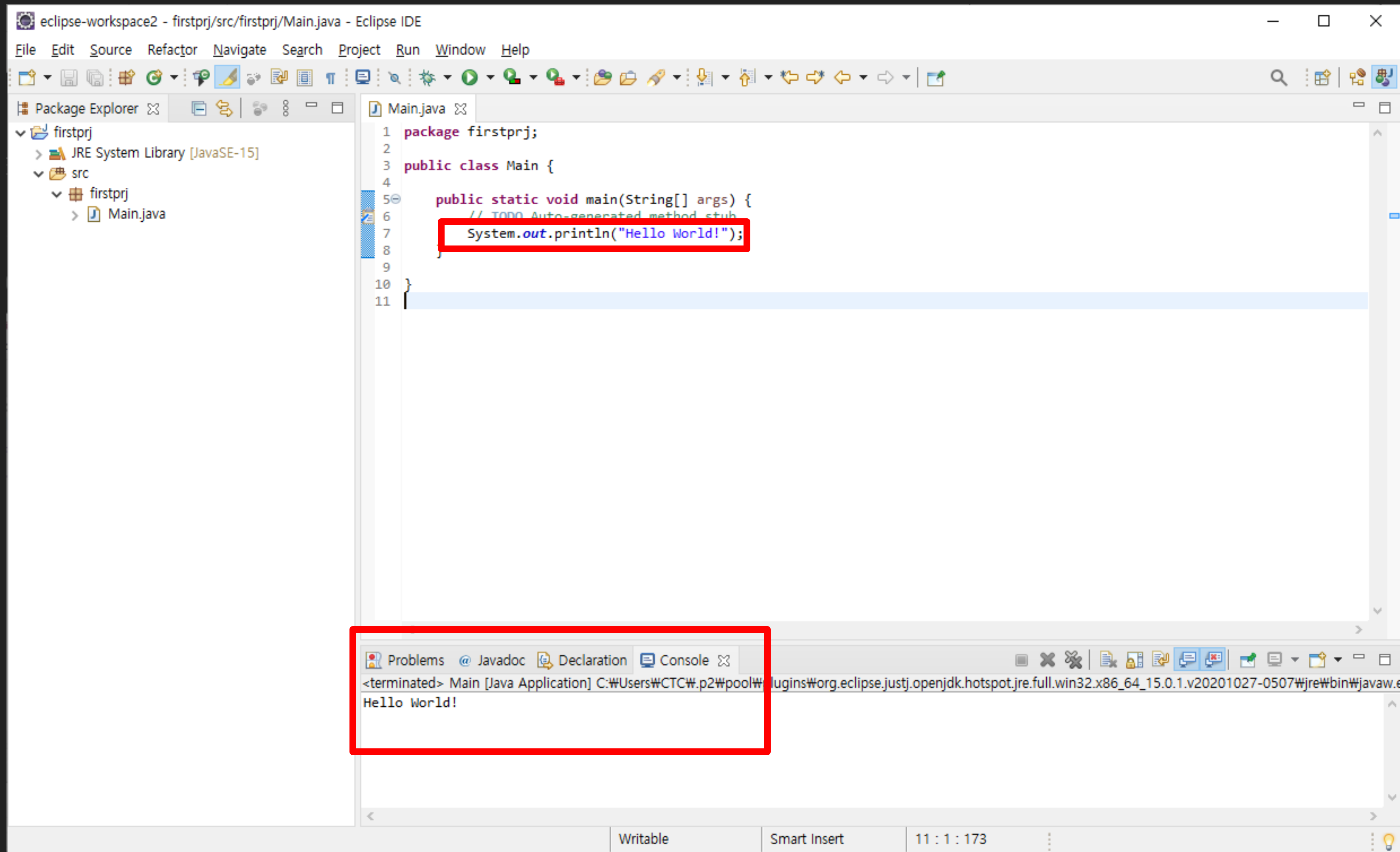
The Package Explorer on the left shows the project structure: First > firstprj > JRE System Library [JavaSE-15] > src > firstprj > Main.java.

The Problems, Javadoc, and Declaration tabs are visible at the bottom.

Beginning of Programming

Print "Hello World!"

- 1) Add a line, "System.out.println("Hello World!");"
- 2) Run > Run As > Java Application



Review Source Code(Cont'd)

Print "Hello World!"

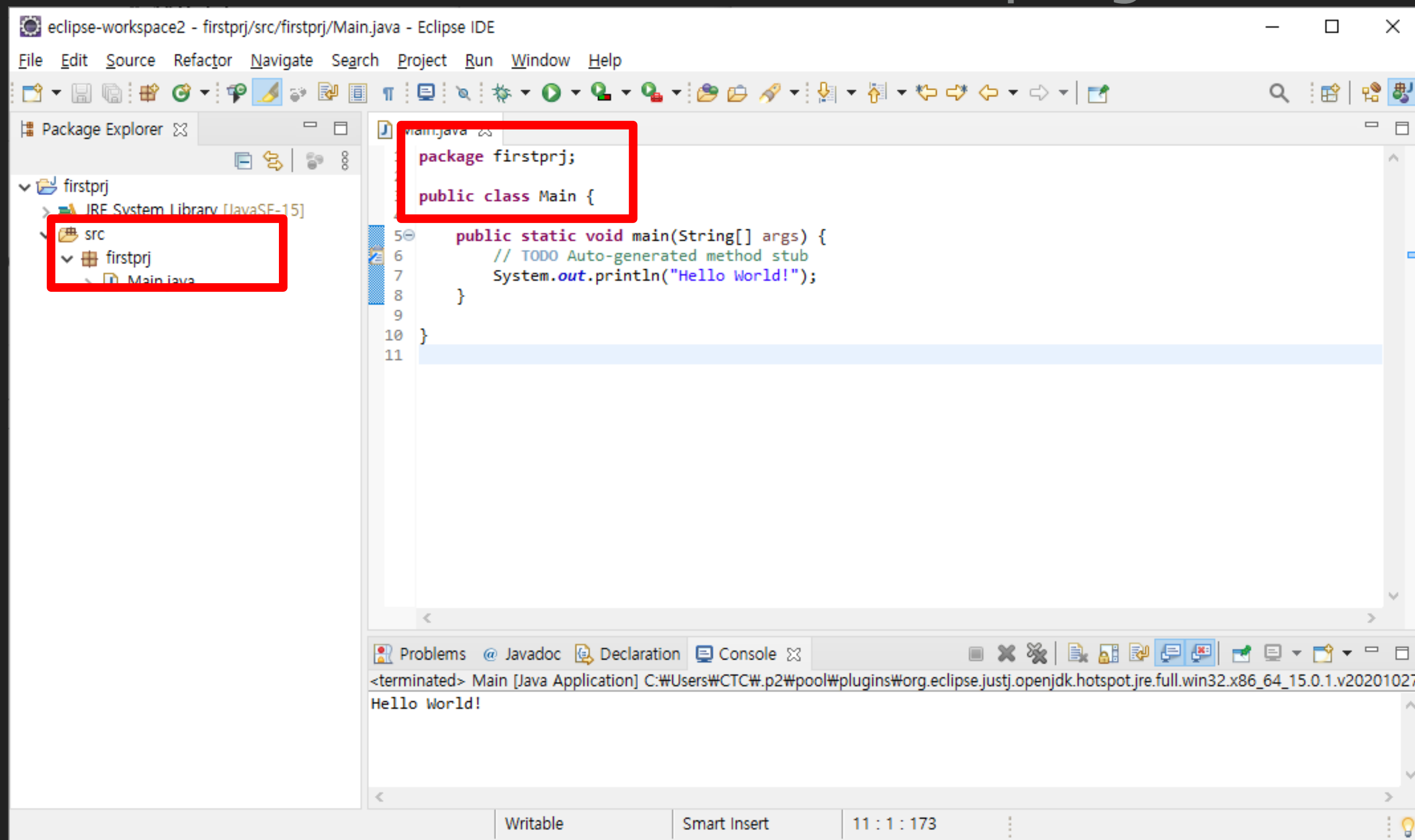
- 1) Project name that you entered
- 3) Class name you entered
- 5) Entry function → public static void main()
- 6) Single line comment
- 7) Call for function to print strings on the screen
- 8, 10) Brackets

```
1  package firstprj;
2
3  public class Main {
4
5      public static void main(String[] args) {
6          // TODO Auto-generated method stub
7          System.out.println("Hello World!");
8      }
9
10 }
```

Review Source Code(Cont'd)

1) Package Name

- ▶ “package” is a reserved word
- ▶ A semicolon is needed at the end of a program line

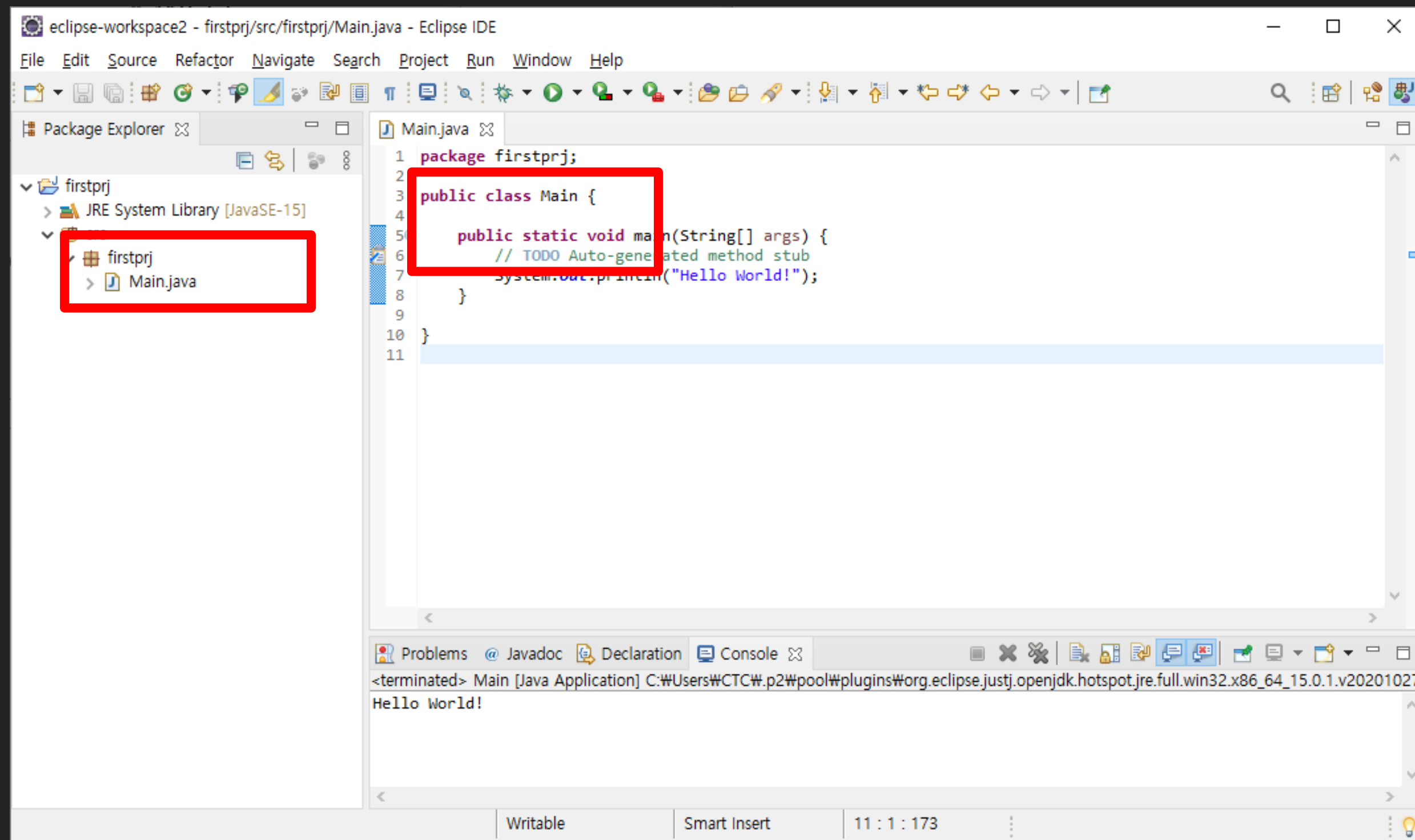


Q8* : Search for Java reserved words and List them up
P1 : Change the package name and run it again
P2 : Remove the semicolon and run it again

Review Source Code(Cont'd)

3) Class Name

- ▶ “public” is a controlling access modifier (cf. default, private, protected)
- ▶ “Main” is the class name



Q9* : Search for Java access modifiers and List them up
P3 : Remove the bracket and run it again
Q10* : Where's closed bracket to the line #3
P4 : Change the class name and run it again

Review Source Code(Cont'd)

5) Function

- ▶ "static" is a variable belonging to the class and initialized only once (cf. final)
- ▶ "main" is the name of the entry function.

```
1 package firstprj;
2
3 public class Main {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7         System.out.println("Hello World!");
8     }
9
10 }
```

Q11* : Search for Java attributes and List them up
P5 : Remove the bracket and run it again
Q12* : Where's closed bracket to the line #5

Review Source Code(Cont'd)

6) Comment

- Used to explain Java code and make it more readable

```
1 package firstprj;
2
3 public class Main {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7         /*
8          * multiline comment
9          */
10        System.out.println("Hello World!"); // single line comment
11    }
12
13 }
```

P6 : Practice and Get used to the comments

Review Source Code

7) Print Strings on the Screen

- Strings are surrounded by the double quotes

```
1 package firstprj;
2
3 public class Main {
4
5     public static void main(String[] args) {
6         // TODO Auto-generated method stub
7         System.out.println("Hello World!");
8     }
9
10 }
```

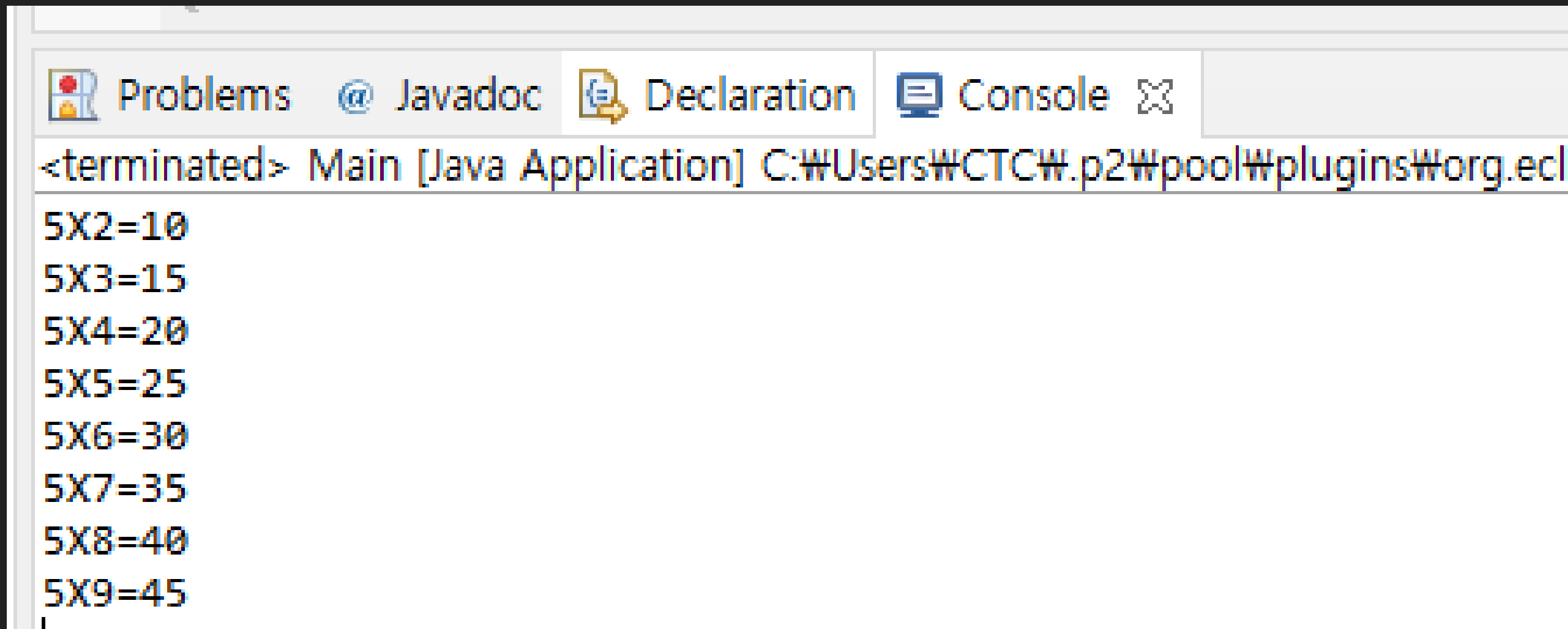
P7 : Print "Hello World!" three times in one line

P8 : Print "Hello World!" three times in three lines

P9

Print N times table

- ▶ Choose N and print the multiplication table N
- ▶ Attach the source code and the console window



The screenshot shows a console window from an IDE. The title bar includes tabs for 'Problems', 'Javadoc', 'Declaration', and 'Console'. The console output shows the application has terminated and then prints the multiplication table for N=5, with each line formatted as '5XN=result'.

```
<terminated> Main [Java Application] C:\Users\CTC\p2\pool\plugins\org.ecl  
5X2=10  
5X3=15  
5X4=20  
5X5=25  
5X6=30  
5X7=35  
5X8=40  
5X9=45
```

Escape Character

Escape Character

- ▶ A character which is used to signal an alternative interpretation of a series of characters

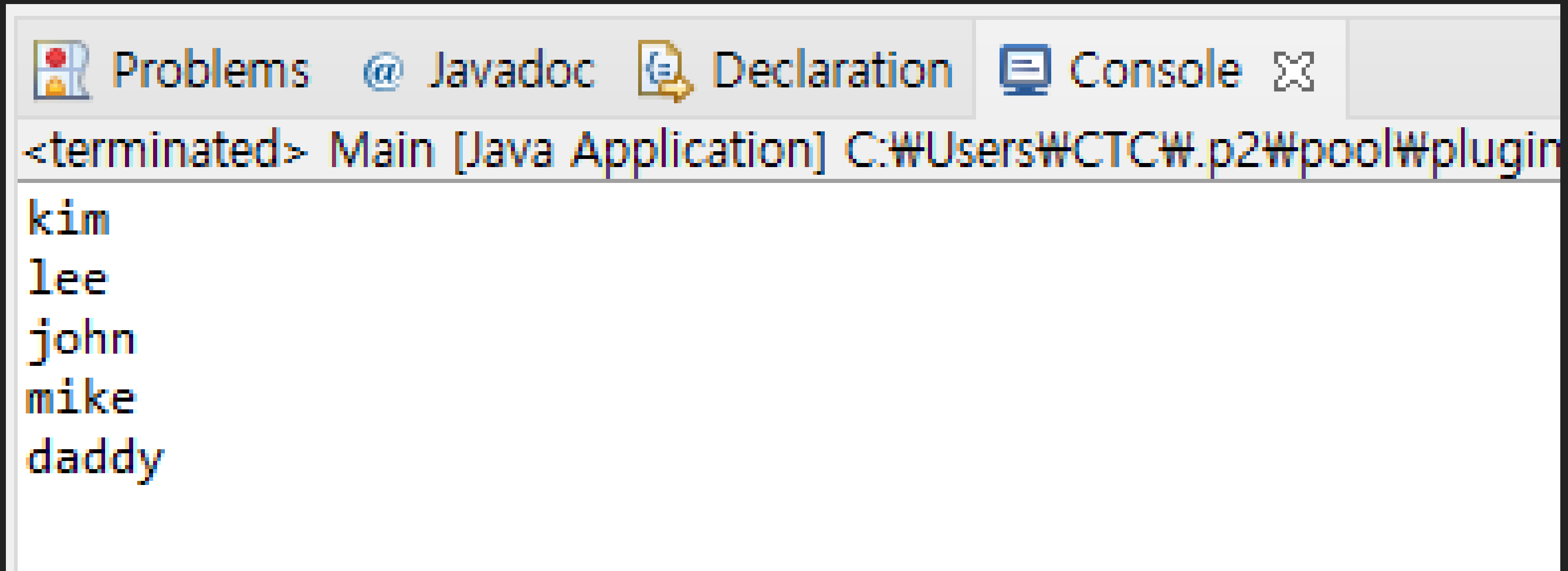
Escape Sequence	Description
\t	Insert a tab
\b	
\n	Insert a newline
\r	
\f	Insert a formfeed
\'	Insert a single quote
\"	Insert a double quote
\\	Insert a backslash

Source : <https://docs.oracle.com/javase/tutorial/java/data/characters.html>

P10

Compose a program with the conditions below

- Use the function, "System.out.print()" only once
- And print the 5 lines of words as below



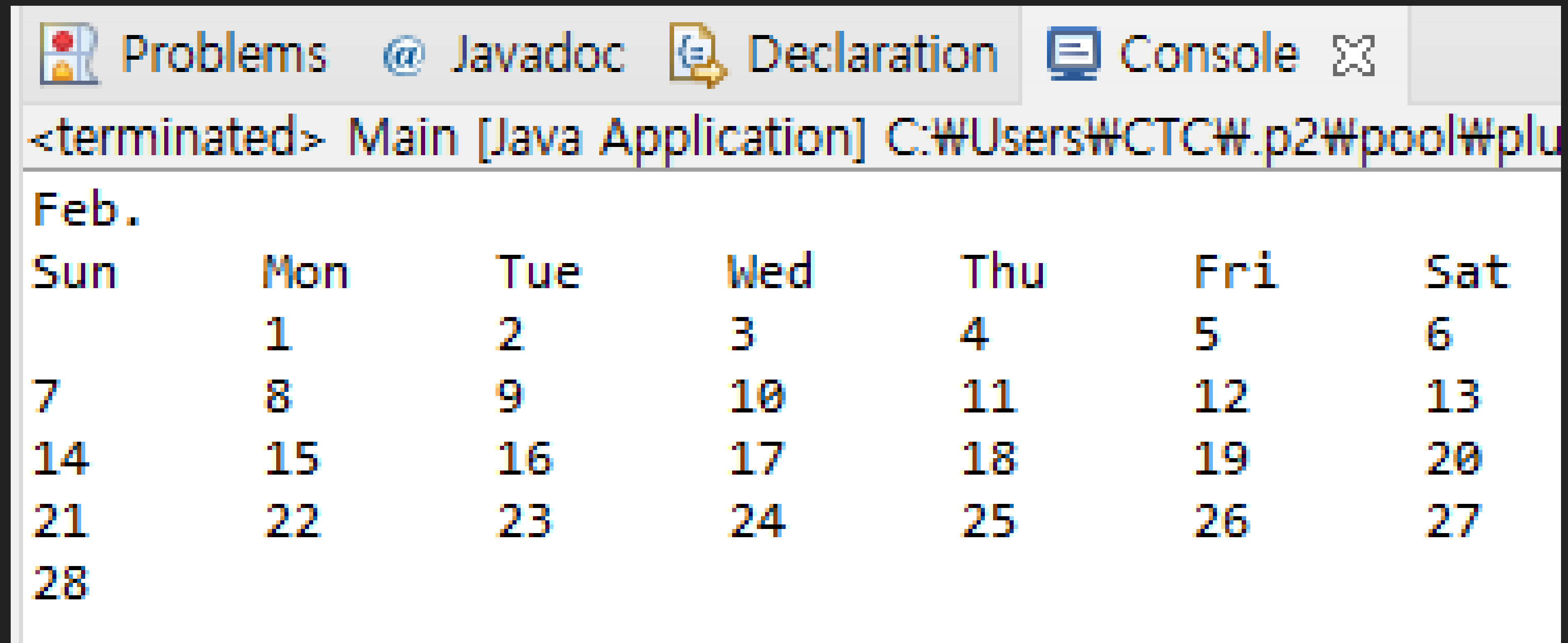
The screenshot shows a Java IDE window with several tabs: Problems, Javadoc, Declaration, and Console. The Console tab is active, displaying the output of a Java application. The output consists of five lines of text: "kim", "lee", "john", "mike", and "daddy". The text is displayed in a monospaced font, with each name on a new line. The console title bar indicates the application is terminated and shows the file path: C:\Users\CTCW.p2\pool\plugin.

```
<terminated> Main [Java Application] C:\Users\CTCW.p2\pool\plugin  
kim  
lee  
john  
mike  
daddy
```


P11

Compose a program with the conditions below

- Use the function, "System.out.print()" within 7 times
- And print the calendar as below

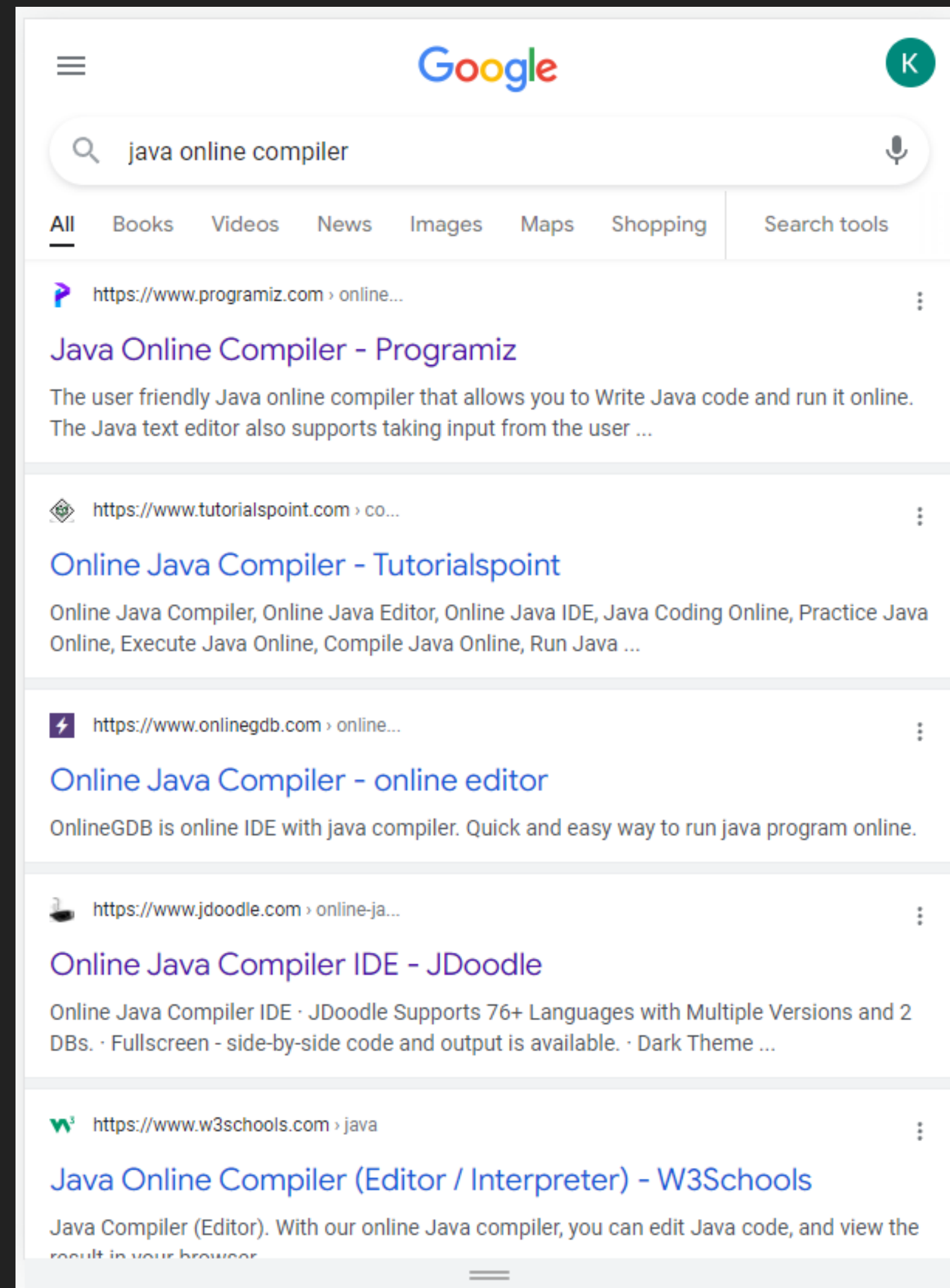


```
<terminated> Main [Java Application] C:\Users\CTCW.p2\pool\plu  
Feb.  
Sun      Mon      Tue      Wed      Thu      Fri      Sat  
         1        2        3        4        5        6  
7        8        9       10       11       12       13  
14       15       16       17       18       19       20  
21       22       23       24       25       26       27  
28
```

Development Environment on the Web(Cont'd)

Online Java Compiler

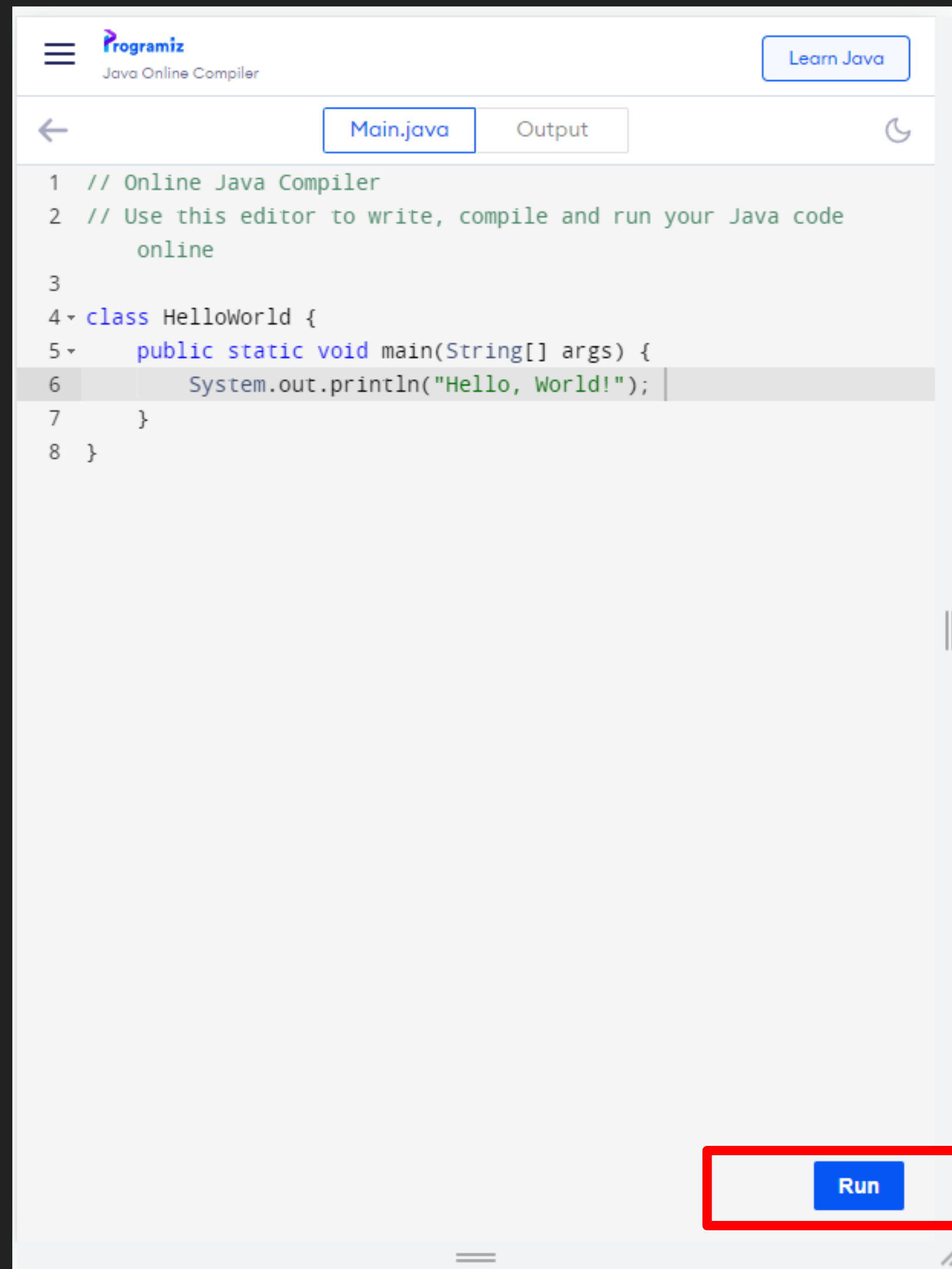
- There are many Java compilers on the web



Development Environment on the Web

One Example for Online Java Compilers

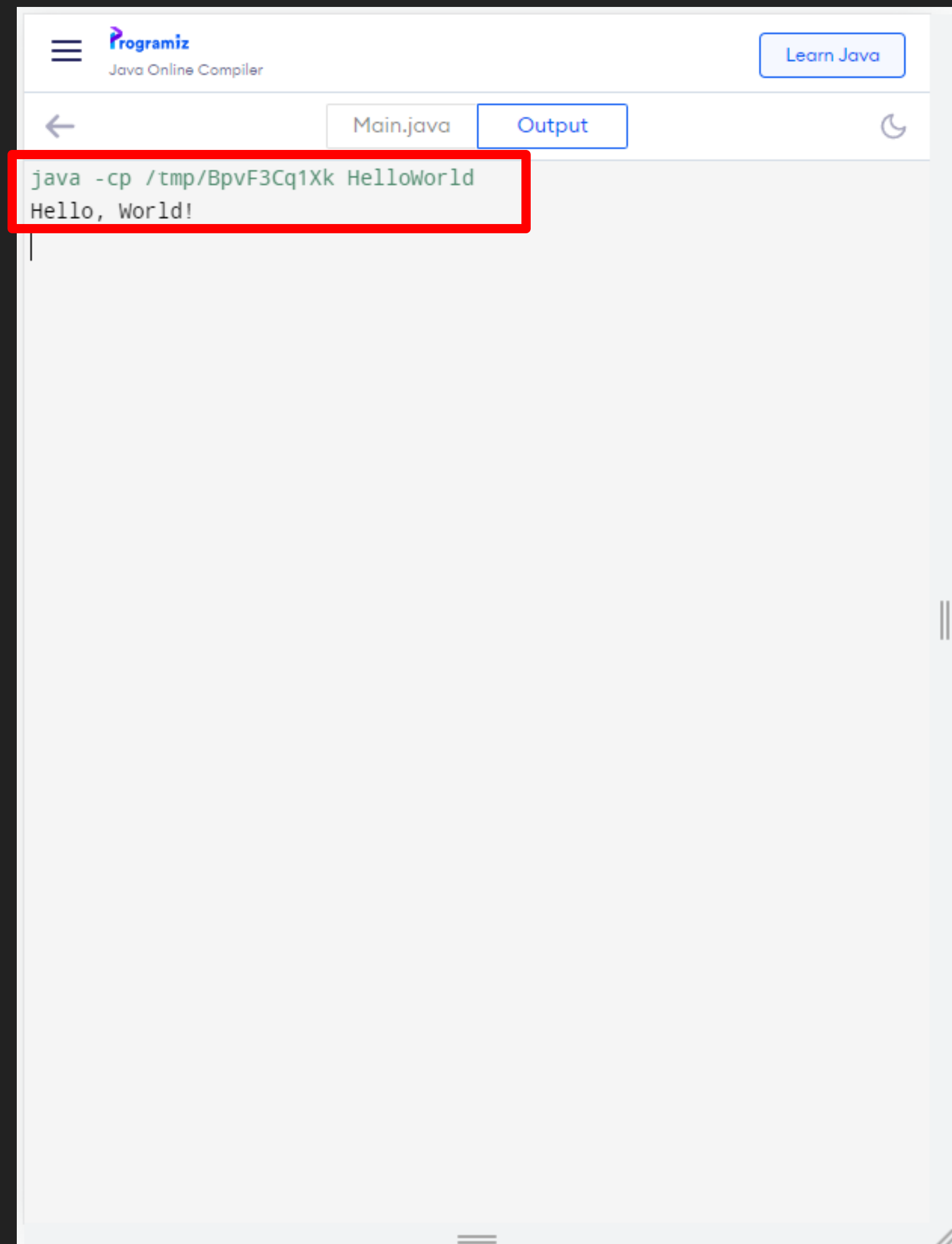
► <https://www.programiz.com/java-programming/online-compiler/>



The screenshot shows the Programiz Java Online Compiler interface. The top bar includes the Programiz logo, the text "Java Online Compiler", and a "Learn Java" button. Below the bar, there are tabs for "Main.java" and "Output". The main editor area contains the following Java code:

```
1 // Online Java Compiler
2 // Use this editor to write, compile and run your Java code
  online
3
4 class HelloWorld {
5     public static void main(String[] args) {
6         System.out.println("Hello, World!");
7     }
8 }
```

A red box highlights the "Run" button at the bottom right of the editor.



The screenshot shows the same Programiz Java Online Compiler interface, but the "Output" tab is selected. The output area displays the result of running the code:

```
java -cp /tmp/BpvF3Cq1Xk HelloWorld
Hello, World!
```

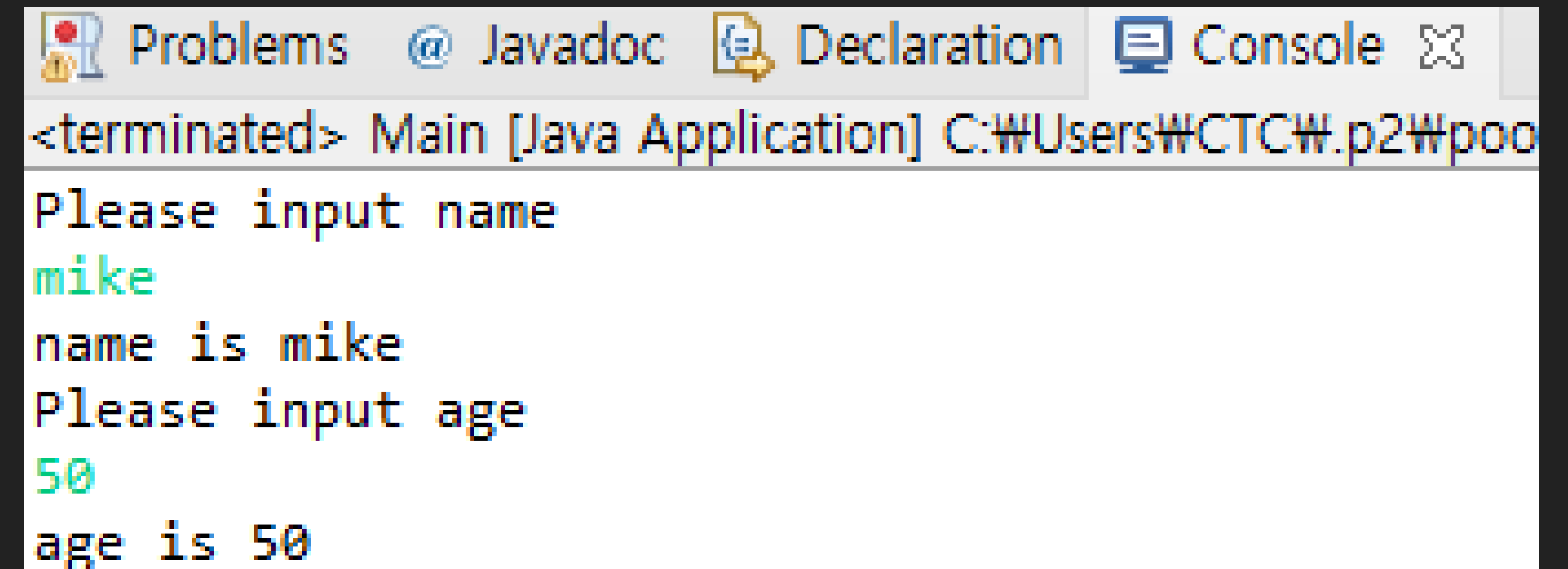
A red box highlights the output text.

Input function

Input Function

- ▶ In order to use the functions of "Scanner", the related source code should be imported
- ▶ The function is depending on the variable data type

```
3 import java.util.Scanner;
4
5 public class Main {
6
7     public static void main(String[] args) {
8         Scanner scanner = new Scanner(System.in);
9         String name;
10        int age;
11
12        System.out.println("Please input name");
13        name = scanner.next();
14        System.out.println("name is " + name);
15
16        System.out.println("Please input age");
17        age = scanner.nextInt();
18        System.out.println("age is " + age);
19    }
20 }
```

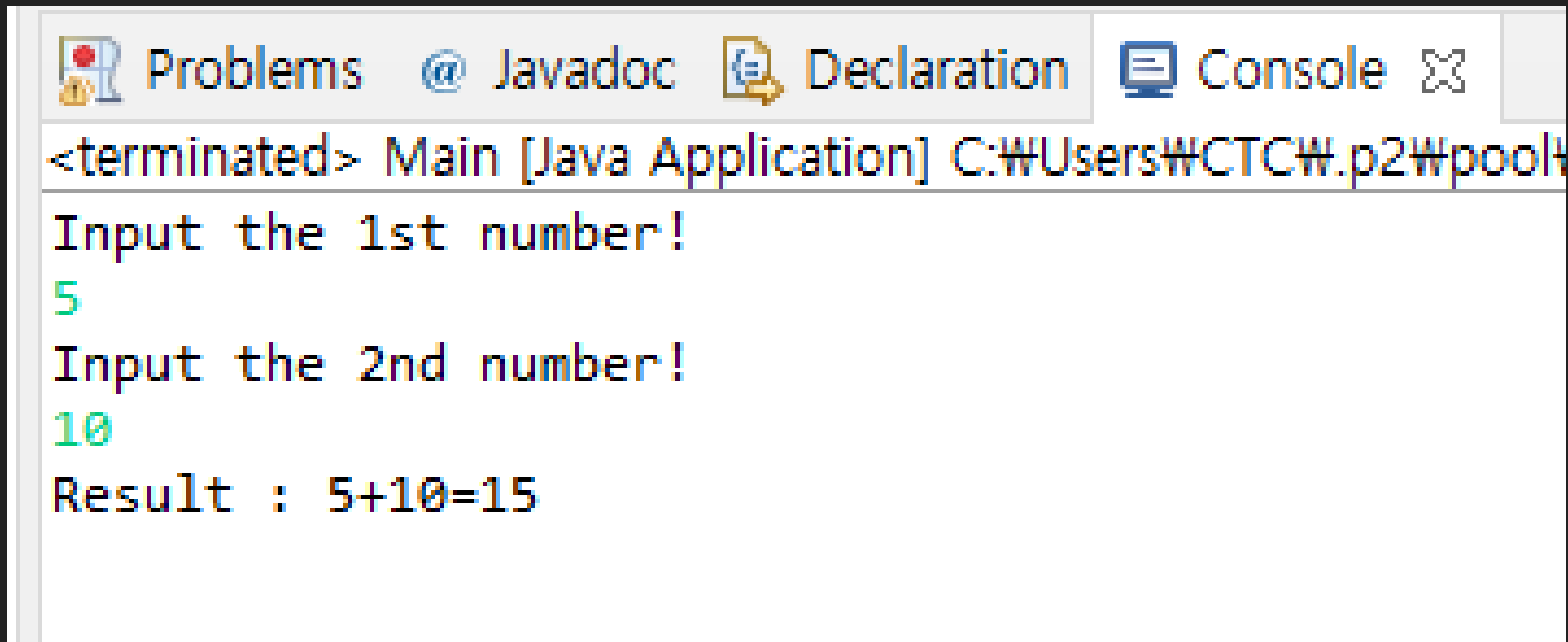


```
<terminated> Main [Java Application] C:\Users\CTC\p2\poo
Please input name
mike
name is mike
Please input age
50
age is 50
```

P12

Compose a program with the conditions below

- ▶ User inputs the two numbers respectively
- ▶ The screen shows the plus calculation process and the result

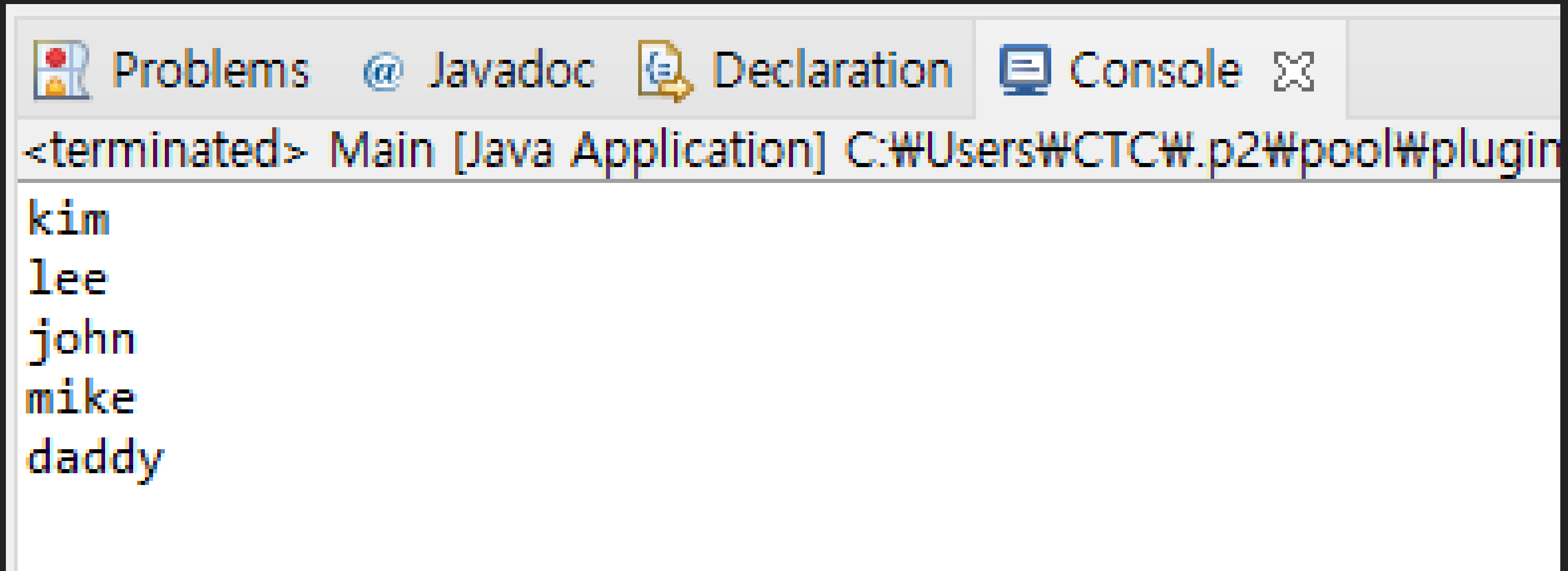


```
Problems @ Javadoc Declaration Console X
<terminated> Main [Java Application] C:\Users\CTCW.p2\pool
Input the 1st number!
5
Input the 2nd number!
10
Result : 5+10=15
```

A1

Compose a program with the conditions below

- Use the function, "System.out.println()" only once
- And print the 5 lines of words as below



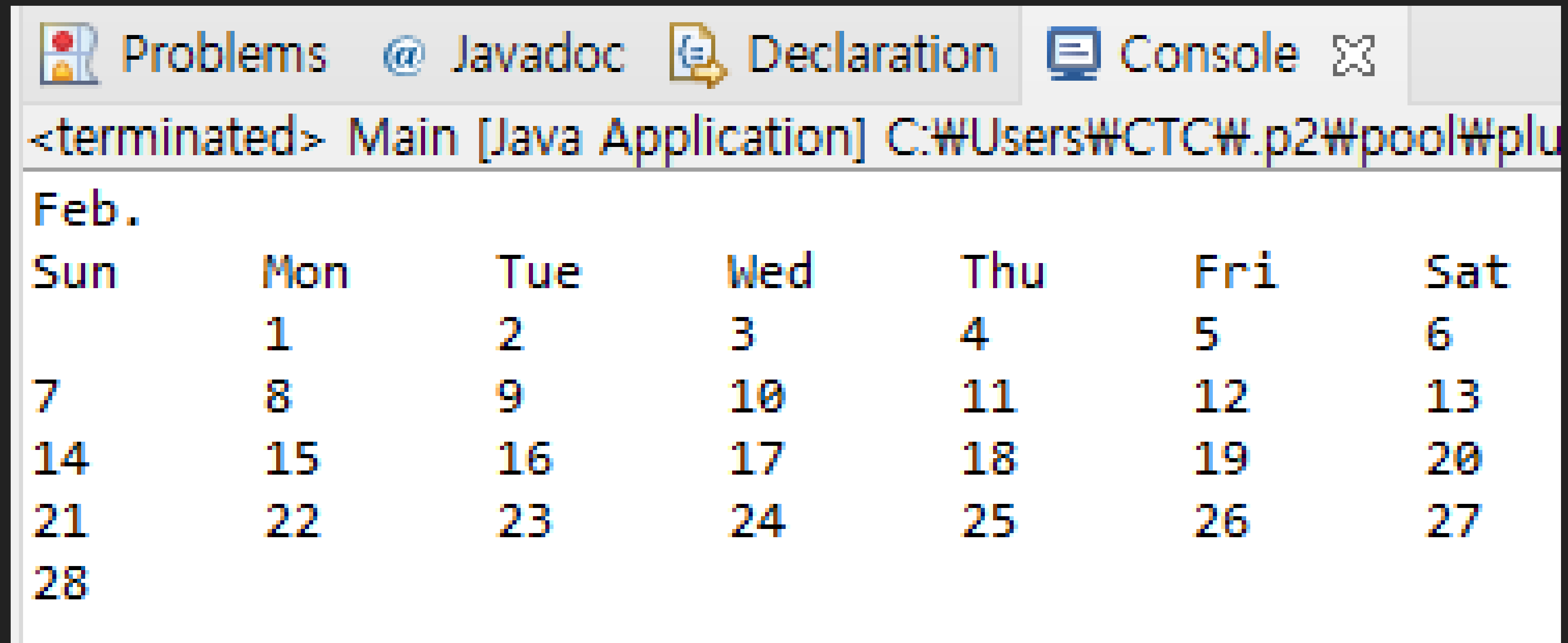
The screenshot shows a Java IDE window with a tab labeled "Console". The console output displays the text "<terminated> Main [Java Application] C:\Users\CTCW.p2\pool\plugin" followed by five lines of names: kim, lee, john, mike, and daddy.

```
<terminated> Main [Java Application] C:\Users\CTCW.p2\pool\plugin  
kim  
lee  
john  
mike  
daddy
```

A2

Compose a program with the conditions below

- ▶ Use the function, "System.out.println()" within 7 times
- ▶ And print the calendar as below



The screenshot shows an IDE window with tabs for Problems, Javadoc, Declaration, and Console. The Console tab is active, displaying the output of a Java application. The output starts with "<terminated> Main [Java Application] C:\Users\CTC\p2\pool\plu" followed by a calendar for February. The calendar is printed in a grid format with days of the week as headers and dates as values.

```
<terminated> Main [Java Application] C:\Users\CTC\p2\pool\plu  
Feb.  
Sun    Mon    Tue    Wed    Thu    Fri    Sat  
      1     2     3     4     5     6  
7      8     9    10    11    12    13  
14     15    16    17    18    19    20  
21     22    23    24    25    26    27  
28
```


정보처리기사 실기 기출문제 대비 1

괄호에 들어갈 코드와 실행 결과를 쓰시오

```
import java.util.(   );

public class Main {

    public static void main(String args[]){
        (   ) scan = new (   ) (System.in);
        int a = scan.nextInt();
        int b = scan.nextInt();
        System.out.printf("%d", a + b);
    }
}
```

정보처리기사 실기 기출문제 대비 2

실행 결과를 쓰시오

```
public class Main {  
    public static void main(String args[]){  
  
        int a = 12, b = 5, sum = 2;  
        b *= a /= 4;  
        sum += ++a * b-- / 4;  
        System.out.printf("%d", sum);  
  
    }  
}
```