Aim

The ‘Java’ programming language is introduced to the students of Engineering in the 2nd year of their technical course. It is essential that we, as students, try to inculcate the capabilities and drawbacks (if any) of the programming language prescribed by the authorities.

The best way to learn a language or a technology and apply the knowledge learnt is to make a project or an application. We have tried to make a simple mini-project entitled **Java Quiz**.

Lots of different concepts of Core Java have been applied, which we will discuss thoroughly in the upcoming pages of the report, in this project.

There were lots of ‘aim’s while implementing this project, but the most decisive and crucial were to observe the behaviour of the language when we actually try to build something using the small building blocks of a programming language.

For example, Garbage Collection and Error Handling, in Java is extensively used to verify if an user is qualified for the further rounds of the Quiz.

Introduction

Basic Information about Java Programming Language

This is the official logo of Java developed by James Goslin at Sun Micrososystems™ (now acquired by Oracle)

Java is a popular general-purpose programming language and computing platform. It is fast, reliable, and secure. Java was built with the philosophy of "write once, run anywhere" (WORA). The Java code (pure Java code and libraries) you write on one platform (operating system) will run on other platforms with no modification.

To run Java, an abstract machine called Java Virtual Machine (JVM) is used. The JVM executes the Java bytecode. Then, the CPU executes the JVM. Since all JVMs works exactly the same, the same code works on other operating systems as well, making Java platform-independent.

Object Oriented Approach of Java

There are different styles of programming. Object-oriented approach is one of the popular programming styles. In object-oriented programming, a complex problem is divided into smaller sets by creating objects. This makes your code reusable, has design benefits, and makes code easier to maintain.

Because of this reason, Java is considered to be one of the most efficient Object – Oriented Programming Language (OOPL).

Many programming languages including Java, Python, and C++ has object-oriented features. If you are serious about programming, you should definitely learn object-oriented style of programming.

Why is Java so popular?

One of the reasons why Java is widely used is because of the availability of huge standard library. The Java environment has hundreds of classes and methods under different packages to help software developers like us.

For example,
java.lang - for advanced features of strings, arrays etc.

java.util - for data structures, regular expressions, date and time functions etc.
java.io - for file i/o, exception handling etc.

Applications of Java

Java technology is everywhere, powering 3 billion devices worldwide. It's more than likely that you have used Java one way or the other. Here are some of the applications of Java.

Application	Brief
Android apps	Java programming language using Android SDK (Software Development Kit) is usually used for developing Android apps
Web apps	Java is used to create Web applications through Servlets, Struts or JSPs. Some of the popular web applications written in Java are: Google.com, Facebook.com, eBay.com, LinkedIn.com etc.
Software Development	Softwares like Eclipse, OpenOffice, Vuze, MATLAB etc use Java.
Big Data Processing	You can use popular software framework like Hadoop (which itself is written in Java) to process Big Data. To use Hadoop, you need to understand Java programming.
Trading System	You can build trading applications having low latency using the Oracle Extreme Java Trading Platform.
Embedded Devices	While C/C++ programming languages are still popular choices for working with embedded systems, Oracle's Java Embedded technologies provide platform and runtime for billions of embedded devices like: televisions, SIM card, Blu-ray Disc players etc.

Besides these applications, Java is also used for game development, scientific applications (like natural language processing), and many others.

Polymorphism in Java

One of the most revered features of Java Programming is the way in which it implements Polymorphism. Polymorphism in Java has two types: Compile time polymorphism (static binding) and Runtime polymorphism (dynamic binding). Method overloading is an example of static polymorphism, while method overriding is an example of dynamic polymorphism. An important example of polymorphism is how a parent class refers to a child class object. In fact, any object that satisfies more than one IS-A relationship is polymorphic in nature.

For instance, let’s consider a class Animal and let Cat be a subclass of Animal. So, any cat IS animal. Here, Cat satisfies the IS-A relationship for its own type as well as its super class Animal.

Multithreading in Java

This is the feature which puts Java in an incomparable position, way above other OOPLs!

Multithreading is a type of execution model that allows multiple threads to exist within the context of a process such that they execute independently but share their process resources. A thread maintains a list of information relevant to its execution including the priority schedule, exception handlers, a set of CPU registers, and stack state in the address space of its hosting process.

With Java's multithreaded feature it is possible to write programs that can perform many tasks simultaneously. This design feature allows the developers to construct interactive applications that can run smoothly.

Multithreading is one feature which is used by programmers all over the world. May it be programmers sitting in Google or Microsoft or Amazon or any company which makes software. Since Java has so many other properties, having Multithreading one of them is like a cherry – on – top!

Project Design

This project tests students understanding about Java Programming language using 3 level testing. Each level consists of 5 questions to be answered.

Level 1: (EASY DIFFICULTY LEVEL)

If a student Is able to able answer at least four correct questions out of five that means student has basic knowledge about Java programming language and he is able to understand Java. The score is shown up and the student is promoted to next level.

Level 2: (MEDIUM DIFFICULTY LEVEL)

If a student answers at least 3 questions correctly out of 5 questions given, this shows that student is having enough knowledge about Java programming language and he is able to perform well Java. The score out of 5 is shown up and the student is promoted to next level.

Level 3: (EXPERT DIFFICULTY LEVEL)

This level consists of some tough questioning with questions mostly testing student's ability to guess the output of given program. If the student answers at least two questions correctly out of 5, this shows that the student has very good knowledge about java programming language. The score card and the message quoting "Congratulations you are a Java Expert is printed on the screen".

The following concepts of Java programming have been extensively used in our project:

1. Objects
2. Classes
3. Inheritance
4. Importing crucial libraries for better User Experience
5. Advanced Java Functions (eg. charAt()) have been used to explore the language more evidently

If – Else conditioning has been used for marking and grading the user. When a question is displayed on the screen, the user has to enter the variable corresponding to the option which indicates the choice the user has to give. This format is not only easy to use, but also easy to maintain.

It is easy to maintain because of the following reasons:

1. If a user enters some other choice, it is possible to either specify his mistake and ask him to rectify it; or straightaway disqualify from attempting the quiz.
2. This can be done by typing required and relevant code in the 'else' parenthesis of the source code.

3. Suppose after 1000 runs or so, the questions become repetitive and stale. It is required that the programmer must change the questions to maintain the uniqueness, original and state – of – the – art USPs (Unique Selling Points) of the program.

4. This is also possible very easily as the questions are written directly into the program and not into some file or database (which is, in reality, very difficult to maintain).

5. As one can see, given the length and duration of the program, the code written is not so big! This is HUGE advantage over other quiz programs which have thousands of lines of code written in them! And even then, they do not work properly as expected from a thousand code program.

6. Our program is not more than 300 lines. This means it can be loaded into the memory very easily and very quickly, too! Therefore, *Time Complexity* of our program is very low.

7. Parallelly, since the program is less than 300 lines long, it takes very less space to be stored! (300 lines is around 3-4 Kilobytes). This means *Space Complexity* of our program is also very low!

8. Thus, our project scores well in the famous 'Time – Space Complexity', a parameter used for quality testing of even the greatest and largest programs and softwares in the industry.

Source Code (Program)

```
import java.util.Scanner;
class level1
{

public int firstlevel()

 {
int k = 0;
  Scanner scan1;  //MAIN SCANNER FOR LEVEL 1
  scan1 = new Scanner(System.in);

  System.out.println(" 1]Java is a ..... language"); //QUESTOIN 1
  System.out.println(" a)weakly typed\n\n b)strongly typed\n\n c)moderate typed \n\n d)none of these");
  System.out.println("Enter Your Answer:");
  char a = scan1.next().charAt(0);

  System.out.println(" 2]How many primitive data types are present in java language"); //QUESTION 2
  System.out.println(" a)6\n\n b)8 \n\n c)4 \n\n d) 10");
  System.out.println("Enter Your Answer:");
  char b = scan1.next().charAt(0);

  System.out.println(" 3]In Java arrays are ..... ");  //QUESTION 3
  System.out.println(" a)object\n\n b)object references\n\n c)primitive data types\n\n d)none of these");
  System.out.println("Enter Your Answer:");
  char c = scan1.next().charAt(0);

  System.out.println(" 4]Object is created  with new keyword at  "); //QUESTION
  System.out.println("a)compile time \n\n b)run time\n\n c)depend on code\n\n d)none of these");
  System.out.println("Enter Your Answer:");
  char d = scan1.next().charAt(0);
```

```
  System.out.println(" 5]Which of the following is not a Java Keyword?");  //QUESTION 5
  System.out.println(" a) Integer\n\n b)try \n\n c)new \n\n d)import");
  System.out.println("Enter Your Answer:");
  char e = scan1.next().charAt(0);

  if(a == 'b')
  {
   k = k + 1;
  }
  if(b == 'b')
  {
   k = k + 1;
  }
  if(c == 'a')
  {
   k = k + 1;
  }
  if(d == 'a')
  {
   k = k + 1;
  }
  if(e == 'a')
  {
   k = k + 1;
  }
return k;
}
}
class level2
{

public int secondlevel()
{
```

```
int j = 0;
            System.out.println("Congratulations!!! You can now access LEVEL 2!");

                Scanner scan2;                  //MAIN SCANNER FOR LEVEL 2
                scan2 = new Scanner(System.in);

                System.out.println(" 1]What is the range of short data type in Java?");
        //QUESTOIN 1
                System.out.println(" a) -128 to 127\n\n b) -32768 to 32767\n\nc) -2147483648 to
2147483647\n\n d) None of the mentioned");
                System.out.println("Enter Your Answer:");
                char m = scan2.next().charAt(0);

                System.out.println(" 2]What is the range of byte data type in Java?"); //QUESTOIN 2
                System.out.println(" a) -128 to 127\n\n b) -32768 to 32767\n\nc) -2147483648 to
2147483647\n\nd) None of the mentioned");
                System.out.println("Enter Your Answer:");
                char n = scan2.next().charAt(0);

                System.out.println(" 3]Which of the following are legal lines of Java code?");
//QUESTOIN 3
                System.out.println("\t1. int w = (int)888.8; \n\t2. byte x = (byte)100L; \n\t3. long y =
(byte)100; \n\t4. byte z = (byte)100L; \n\na) 1 and 2 \n\nb) 2 and 3 \n\nc) 3 and 4 \n\nd) All statements are
correct");
                System.out.println("Enter Your Answer:");
                char o = scan2.next().charAt(0);

                System.out.println(" 4]An expression involving byte, int, and literal numbers is
promoted to which of these?"); //QUESTOIN 4
                System.out.println(" a) int \n\nb) long\n\nc) byte\n\nd) float");
                System.out.println("Enter Your Answer:");
                char p = scan2.next().charAt(0);

                System.out.println("Which of these literals can be contained in float data type
variable?"); //QUESTOIN 5
```

```
System.out.println("a) -1.7e+308\n\n b) -3.4e+038 \n\nc) +1.7e+308 \n\nd) -3.4e+050");
System.out.println("Enter Your Answer:");
char q = scan2.next().charAt(0);

if(m == 'b')
{
j = j + 1;
}
if(n == 'b')
{
        j = j + 1;
}
if(o == 'a')
{
        j = j + 1;
}
if(p == 'a')
{
        j = j + 1;
}
if(q == 'a')
{
        j = j + 1;
}
return j;
}
}
class level3
{
```

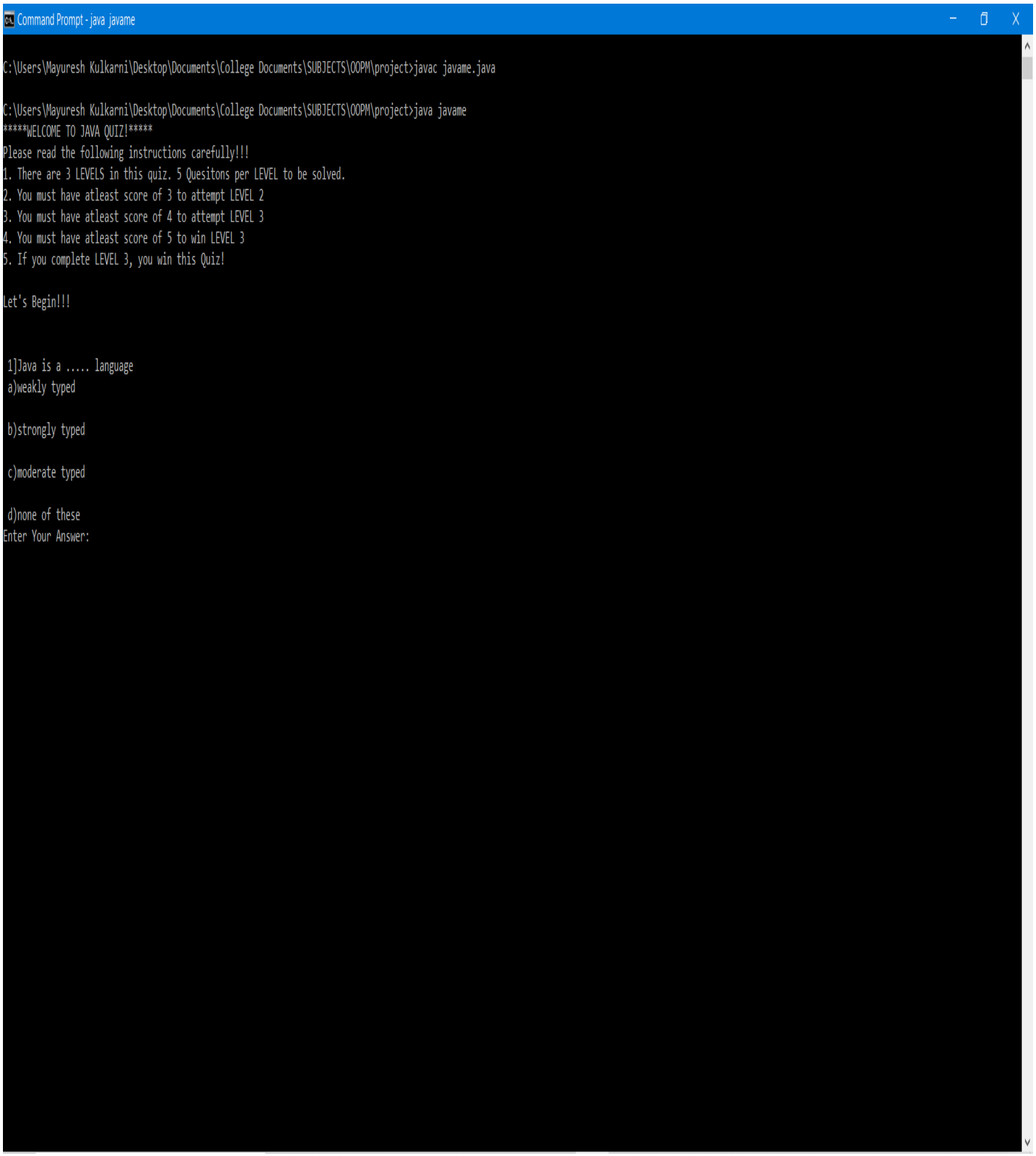
```
public int thirdlevel()
{
int i = 0;
                System.out.println("Congratulations!!! You can now access LEVEL 3!");

                        Scanner scan3;                  //MAIN SCANNER FOR LEVEL 3
                        scan3 = new Scanner(System.in);

                        System.out.println(" 1]Which data type value is returned by all transcendental math functions?");
                        System.out.println("a) int \n\n b) float \n\n c) double\n\n d) long");
                        System.out.println("Enter Your Answer:");
                        char r = scan3.next().charAt(0);

                        System.out.println(" 2]What will be the output of the following Java code?"); //QUESTOIN 2
                        System.out.println("class average \n{public static void main(String args[])\n{\ndouble num[] = {5.5, 10.1, 11, 12.8, 56.9, 2.5};\ndouble result;\nresult = 0;\nfor (int i = 0; i < 6; ++i) \nresult = result + num[i];\nSystem.out.print(result/6);\n} \n}");
                        System.out.println("a) 16.34\n\nb) 16.566666644\n\nc) 16.46666666666667\n\n d) 16.46666666666666 ");
                        System.out.println("Enter Your Answer:");
                        char s = scan3.next().charAt(0);

                        System.out.println(" 3] Which of these operators is used to allocate memory to array variable in Java?");
                        System.out.println("a) malloc\n\nb) alloc\n\nc) new\n\nd) new malloc");
                        System.out.println("Enter Your Answer:");
                        char t = scan3.next().charAt(0);

                        System.out.println(" 4] Which of these is an incorrect array declaration?"); //QUESTOIN 4
                        System.out.println(" a) int arr[] = new int[5]\n\nb) int [] arr = new int[5]\n\nc) int arr[] = new int[5]\n\nd) int arr[] = int [5] new");
                        System.out.println("Enter Your Answer:");
                        char u = scan3.next().charAt(0);
```

```
System.out.println(" 5]Which of these is an incorrect Statement?"); //QUESTOIN 5

System.out.println("a) It is necessary to use new operator to initialize an array\n\nb) Array can be initialized using comma separated expressions surrounded by curly braces\n\nc) Array can be initialized when they are declared\n\nd) None of the mentioned" );

System.out.println("Enter Your Answer:");

char v = scan3.next().charAt(0);



if(r == 'b')

{

        i = i + 1;

}

if(s == 'b')

{

        i = i + 1;

}

if(t == 'a')

{

        i = i + 1;

}

if(u == 'a')

{

        i = i + 1;

}

if(v == 'a')

{

        i = i + 1;

}


return i;

}

}
```

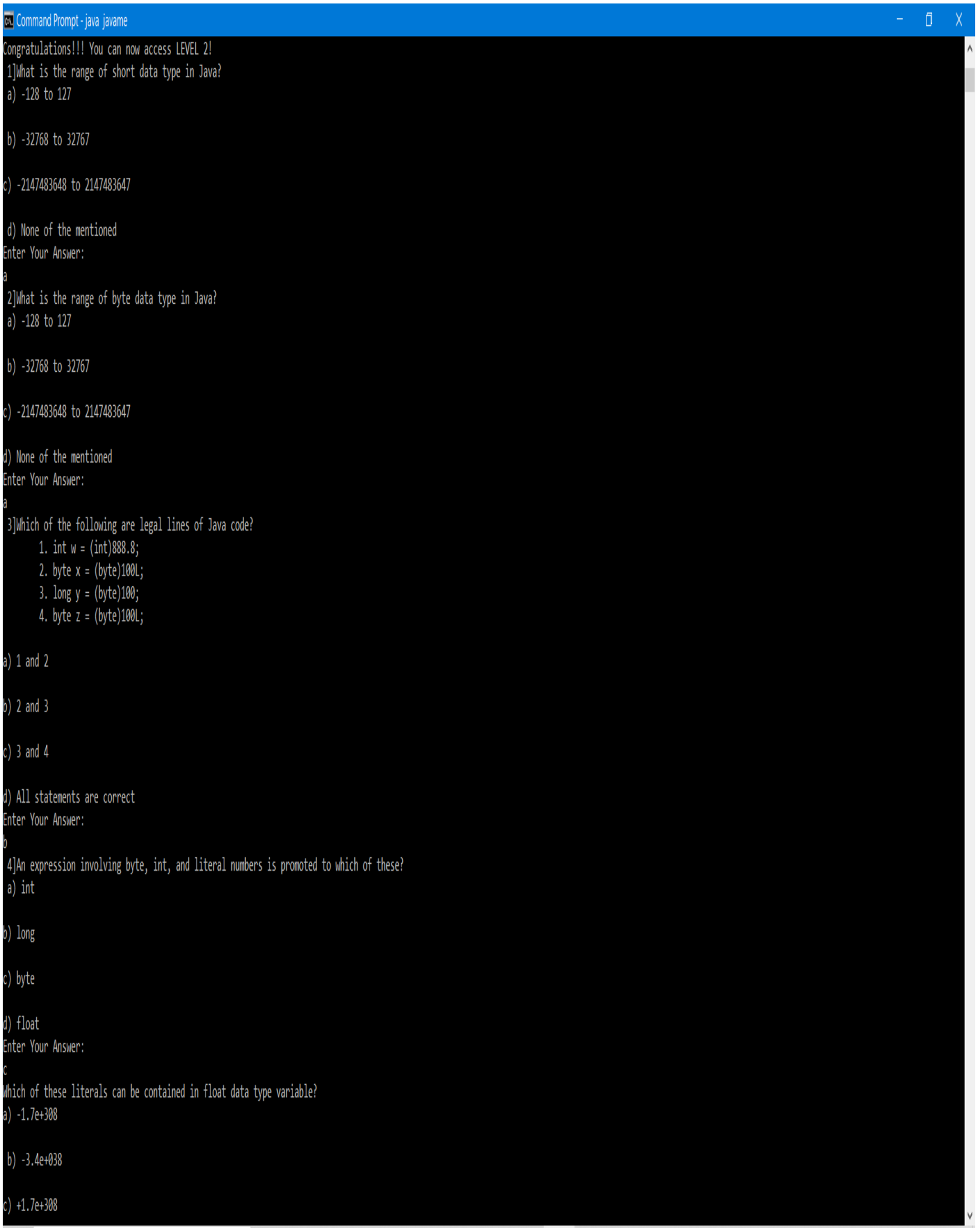
```
public class javame
{
    public static void main(String[] args)
    {
    System.out.println("*****WELCOME TO JAVA QUIZ!*****");
    System.out.println("Please read the following instructions carefully!!!");
    System.out.println("1. There are 3 LEVELS in this quiz. 5 Quesitons per LEVEL to be solved.");
    System.out.println("2. You must have atleast score of 3 to attempt LEVEL 2");
    System.out.println("3. You must have atleast score of 4 to attempt LEVEL 3");
    System.out.println("4. You must have atleast score of 5 to win LEVEL 3");
    System.out.println("5. If you complete LEVEL 3, you win this Quiz!");
    System.out.println("");
    System.out.println("Let's Begin!!!\n\n");

  level1 one =new level1();
  int z=one.firstlevel();
  level2 two=new level2();
  int w=two.secondlevel();
  two.secondlevel();
  level3 t= new level3();
  int last=t.thirdlevel();

  if(z>3)
  {
  two.secondlevel();

  if(w>4)
  {
   t.thirdlevel();
  }
   else
     {
       System.out.println("sorry plss try again");
```

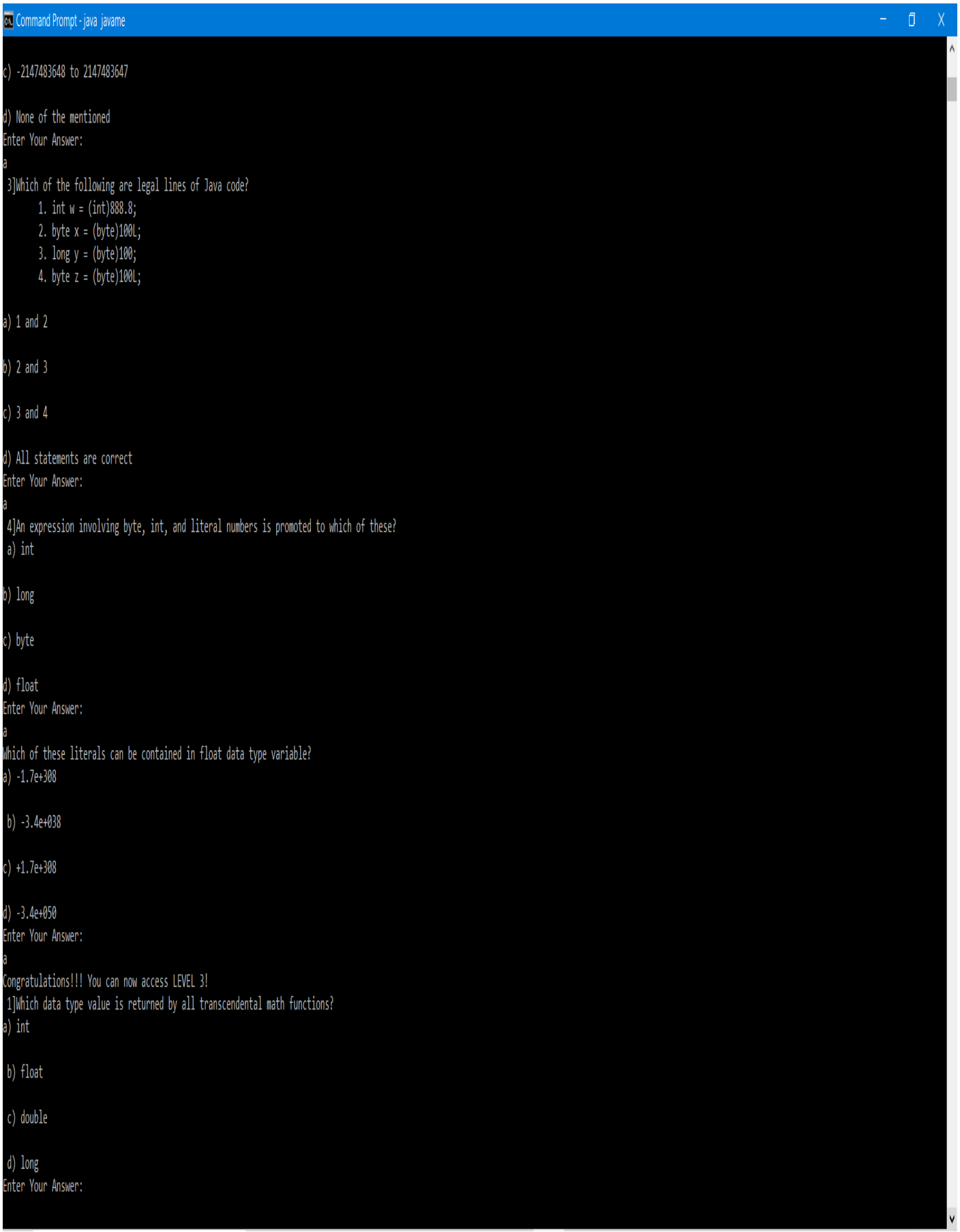
```
        }


    if(last>5)
    {
     System.out.println("Congratulations you are an java expert");
    }
     }



}
}
```

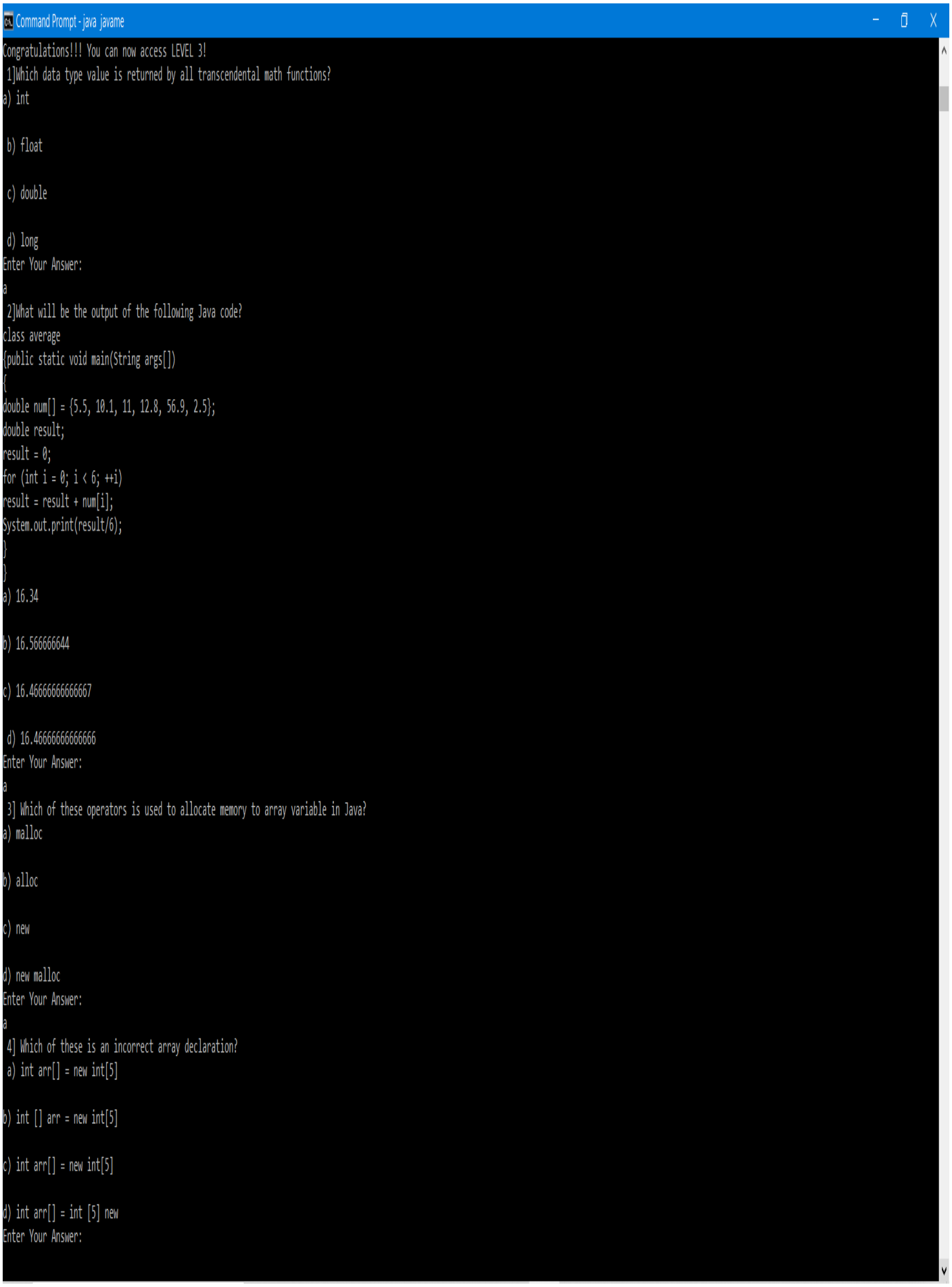
Output


Command Prompt - java javame
C:\Users\Mayuresh Kulkarni\Desktop\Documents\College Documents\SUBJECTS\OOPM\project>javac javame.java
C:\Users\Mayuresh Kulkarni\Desktop\Documents\College Documents\SUBJECTS\OOPM\project>java javame
*****WELCOME TO JAVA QUIZ!*****
Please read the following instructions carefully!!!
1. There are 3 LEVELS in this quiz. 5 Quesitons per LEVEL to be solved.
2. You must have atleast score of 3 to attempt LEVEL 2
3. You must have atleast score of 4 to attempt LEVEL 3
4. You must have atleast score of 5 to win LEVEL 3
5. If you complete LEVEL 3, you win this Quiz!
Let's Begin!!!
1]Java is a ..... language
a)weakly typed
b)strongly typed
c)moderate typed
d)none of these
Enter Your Answer:


Command Prompt - java javame
b
2]How many primitive data types are present in java language
a)6
b)8
c)4
d) 10
Enter Your Answer:
b
3]In Java arrays are .....
a)object
b)object references
c)primitive data types
d)none of these
Enter Your Answer:
c
4]Object is created with new keyword at
a)compile time
b)run time
c)depend on code
d)none of these
Enter Your Answer:
a
5]Which of the following is not a Java Keyword?
a) Integer
b)try
c)new
d)import
Enter Your Answer:
a
Congratulations!!! You can now access LEVEL 2!
1]What is the range of short data type in Java?
a) -128 to 127
b) -32768 to 32767
c) -2147483648 to 2147483647
d) None of the mentioned
Enter Your Answer:


Command Prompt - java javame
Congratulations!!! You can now access LEVEL 2!
1]What is the range of short data type in Java?
a) -128 to 127
b) -32768 to 32767
c) -2147483648 to 2147483647
d) None of the mentioned
Enter Your Answer:
a
2]What is the range of byte data type in Java?
a) -128 to 127
b) -32768 to 32767
c) -2147483648 to 2147483647
d) None of the mentioned
Enter Your Answer:
a
3]Which of the following are legal lines of Java code?
1. int w = (int)888.8;
2. byte x = (byte)100L;
3. long y = (byte)100;
4. byte z = (byte)100L;
a) 1 and 2
b) 2 and 3
c) 3 and 4
d) All statements are correct
Enter Your Answer:
b
4]An expression involving byte, int, and literal numbers is promoted to which of these?
a) int
b) long
c) byte
d) float
Enter Your Answer:
c
Which of these literals can be contained in float data type variable?
a) -1.7e+308
b) -3.4e+038
c) +1.7e+308


Command Prompt - java javame
c) -2147483648 to 2147483647
d) None of the mentioned
Enter Your Answer:
a
3]Which of the following are legal lines of Java code?
1. int w = (int)888.8;
2. byte x = (byte)100L;
3. long y = (byte)100;
4. byte z = (byte)100L;
a) 1 and 2
b) 2 and 3
c) 3 and 4
d) All statements are correct
Enter Your Answer:
a
4]An expression involving byte, int, and literal numbers is promoted to which of these?
a) int
b) long
c) byte
d) float
Enter Your Answer:
a
Which of these literals can be contained in float data type variable?
a) -1.7e+308
b) -3.4e+038
c) +1.7e+308
d) -3.4e+050
Enter Your Answer:
a
Congratulations!!! You can now access LEVEL 3!
1]Which data type value is returned by all transcendental math functions?
a) int
b) float
c) double
d) long
Enter Your Answer:


Command Prompt - java javame
Congratulations!!! You can now access LEVEL 3!
1]Which data type value is returned by all transcendental math functions?
a) int
b) float
c) double
d) long
Enter Your Answer:
a
2]What will be the output of the following Java code?
class average
{public static void main(String args[])
{
double num[] = {5.5, 10.1, 11, 12.8, 56.9, 2.5};
double result;
result = 0;
for (int i = 0; i < 6; ++i)
result = result + num[i];
System.out.print(result/6);
}
}
a) 16.34
b) 16.566666644
c) 16.46666666666667
d) 16.466666666666666
Enter Your Answer:
a
3] Which of these operators is used to allocate memory to array variable in Java?
a) malloc
b) alloc
c) new
d) new malloc
Enter Your Answer:
a
4] Which of these is an incorrect array declaration?
a) int arr[] = new int[5]
b) int [] arr = new int[5]
c) int arr[] = new int[5]
d) int arr[] = int [5] new
Enter Your Answer:

Command Prompt

```
 d) None of the mentioned
Enter Your Answer:
a
 2]What is the range of byte data type in Java?
 a) -128 to 127

 b) -32768 to 32767

c) -2147483648 to 2147483647

d) None of the mentioned
Enter Your Answer:
a
 3]Which of the following are legal lines of Java code?
       1. int w = (int)888.8;
       2. byte x = (byte)100L;
       3. long y = (byte)100;
       4. byte z = (byte)100L;

a) 1 and 2

b) 2 and 3

c) 3 and 4

d) All statements are correct
Enter Your Answer:
a
 4]An expression involving byte, int, and literal numbers is promoted to which of these?
 a) int

b) long

c) byte

d) float
Enter Your Answer:
a
Which of these literals can be contained in float data type variable?
a) -1.7e+308

 b) -3.4e+038

c) +1.7e+308

d) -3.4e+050
Enter Your Answer:
a
sorry plss try again

C:\Users\Mayuresh Kulkarni\Desktop\Documents\College Documents\SUBJECTS\OOPM\project>
```

Conclusion

To conclude, we can say that Java is indeed a wonderful language having enormous capacity to have an everlasting impact on the world of programming.

By making such projects and programs only, one can truly learn how a programming language can transform the way we code.

It was a wonderful experience overall!