1. What are the different primitive data types available in Java?

The different primitive datatypes in java are
byte,short,int,float,long,boolean,double,char

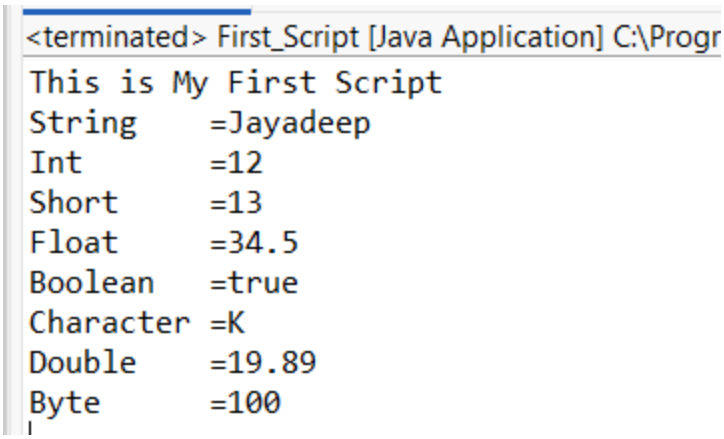
2. Explain the difference between primitive and non-primitive data types in Java.

The difference between primitive and non-primitive data types is

Primitive are built in datatypesin java .The size is fixed.where as non primitive datatypes are those which are created by the user and also size varies .

3. Write a Java program that demonstrates the use of all primitive data types.

```
package Basic_module;


public class First_Script {
String name="Jayadeep";
int number=12;
short number2=13;
float number3=34.5f;
boolean a = true;
char name2='K';
double d=19.89d;
byte b=100;
      long l;
public static void main(String[] args)
{
System.out.println("This is My First Script");
First_Script obj=new First_Script();
System.out.println("String ="+ obj.name);
System.out.println("Int ="+ obj.number);
System.out.println("Short ="+ obj.number2);
System.out.println("Float ="+ obj.number3);
System.out.println("Boolean ="+ obj.a);
System.out.println("Character ="+ obj.name2);
System.out.println("Double ="+obj.d);
System.out.println("Byte ="+obj.b);
             System.out.println("Long ="+obj.l);
}
}
```



4. What is type casting? Provide an example of implicit and explicit casting in Java.

Coversion of one data type to another is called type casting.

Implicit Coversion:

It is automatically done .

Like int to double

Explicit Conversion:

It is explicitly casted by the user.

Like double to int(we will loose the floating points)

5. What is the default value of each primitive data type in Java?

The default of each primitive datatype is
int-4 bytes

Short-0

Byte-0

Int-0

Long-0

Float-0.0

Double-0.0

Char-0

Boolean-false

Section-2

1. What are control statements in Java? List the types with examples.

Which controls the flow of execution in the program based on certaion loops or conditions.

Three types

1.Decision Making Statements

if

If-else

If –elseif

Switch

2.looping

For

while

dowhile

foreach

3.Jump

Break

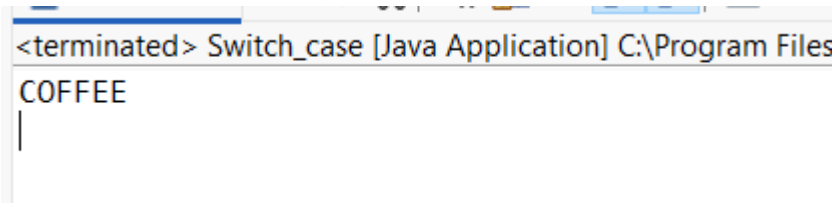
Continue

2. Write a Java program to demonstrate the use of if-else and switch-case statements.

```
package ControlStatements;

public class if_else_ifladder {

public static void main(String[] args) {

String signal_color="RED";
if(signal_color=="RED") {
System.out.println("STOP");
}
else if(signal_color=="Yellow") {
System.out.println("Ready");
```

```
}
else if(signal_color=="Green") {
System.out.println("GO");
}
else {
System.out.println("Invalid color");
}
```


```
package ControlStatements;

import java.util.Scanner;

public class Switch_case {

public static void main(String[] args) {
int val=2;
switch(val)
{
case 1:
System.out.println("TEA");
break;
case 2:
System.out.println("COFFEE");
break;
case 3:
System.out.println("JUICE");
break;
default:
System.out.println("Invalid Input Enter valid input for tea,coffee,juice");
}
```




```
}}
```

3.What is the difference between break and continue statements?

The differnece between the brak and continue statement is where brak is used to exit the loop where as continue is used to skip the iteration.

4. Write a Java program to print even numbers between 1 to 50 using a for loop.

```
package ControlStatements;

import java.util.Scanner;

public class For_loop {

public static void main(String[] args) {
System.out.println("Even Numbers from 1 to 50 are");
for(int i=1;i<=50;i++) {
if(i%2==0) {
System.out.print(i+" ");
}
}

}}
```

```
<terminated> For_loop [Java Application] C:\Program Files\Java\jdk-20\bin\javaw.exe  (Aug 10, 2025, 12:25:32 PM – 1
Even Numbers from 1 to 50 are
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
```

5. Explain the differences between while and do-while loops with examples.

While is used when the number of iterrations to be iterated is unknown where as do while is used to execute the loop atleast once.

DO WHILE

```
int k=2      ;
do {
System.out.println(k);
k++;
}while(k<1);
```

```
<terminated> Loops [Java Application] C:\Program File
2
```

WHILE

```
int i=1;
while(i<=10) {
System.out.println(i);
i++;
```

```
}
```

```
<terminated> Loops [Java Appl
1
2
3
4
5
6
7
8
9
10
```

Section 3:

1. What are keywords in Java? List 10 commonly used keywords.

```
Keywords are those which have predefined meanings and cannot be used as an
identifiers.
Example:
Class,
Public,private,static,void,int,if,else,switch,for,while,return
```

2. Explain the purpose of the following keywords: static, final, this, super.

```
Static-shared across all objects ,accesible with classname
Final-which is used to declare constants.
This-it refers to the current object instances.
Super-used for refering parent class properties.
```

3. What are the types of operators in Java?

```
There are different types of operators in java they are:
1.Relational operators
2.Logical operators
3.Arithemtic operators
4.Assignment operators
5.bitwise operator
6.shift operators
7.unary operators
8.instanceof operator
```

4. Write a Java program demonstrating the use of arithmetic, relational, and logical operators.

```
package ControlStatements;

public class Logical_AND {

public static void main(String[] args) {


		int a=5,b=10;
		System.out.println("Addition is "+(a+b));
		System.out.println("a>b "+(a>b));
		System.out.println("Logical "+(a&b));

		}

		}
```

```
<terminated> Logical_AND [Java Application] C:\Program Files\Java
Addition is 15
a>b  false
Logical 0
```

5. What is operator precedence? How does it affect the outcome of expressions?

determines the order in which operators are evaluated in an expression

int result = 5 + 3 * 2;//11 where multiplaction given highest priority.

Additional Questions

6. What is the size and range of each primitive data type in Java?

Byte	1byte	-128 to 127
Short	2 bytes	-32768 t0 32767
Int	4 bytes	-2^31 to 2^31-1
Long	8 bytes	-2^63 to2^63-1
float	4bytes	
double	8bytes	
char	2bytes	0 t0 65,535

Boolean	1bit	true or false

7. How does Java handle overflow and underflow with numeric types?

Java handles overflow and underflow with numeric types differently depending on whether the type is an integer or a floating-point number.

Integer Types

- Overflow: Adding 1 to Integer.MAX_VALUE results in Integer.MIN_VALUE.
- Underflow: Subtracting 1 from Integer.MIN_VALUE results in Integer.MAX_VALUE.

Detection and Prevention:

- Math.addExact(), Math.subtractExact(), Math.multiplyExact(): These methods, available since Java 8, perform the respective arithmetic operation and throw an ArithmeticException if an overflow or underflow occurs, allowing for explicit error handling.

Floating-Point

When floating-point operations result in values outside their representable range, Java uses special values defined by the IEEE 754 standard.

- Overflow: Results in Infinity (positive or negative, depending on the sign of the overflowed value).
- Underflow: Results in 0.0 (positive or negative, depending on the sign of the underflowed value), often referred to as "gradual underflow" where precision is lost as the number approaches zero.

8. Write a program to convert a double value to an int without data loss.

Checking whether it has fractional part ot not and also using Math.round()

9. What is the difference between char and String in Java?

Char is single charatcter

Whre string is a collection of characters.

10. Explain wrapper classes and their use in Java.

Wrapper classes in Java convert primitive types into objects (Integer, Character). They enable primitives to be used in collections and provide utility methods.

6. Write a Java program using nested if statements.

```
package ControlStatements;

public class if_else_ifladder {

public static void main(String[] args) {


boolean isreg=true;
boolean hashallticket=true;
if(isreg) {
if(hashallticket) {
System.out.println("You can Write your Exam");
}
else {
System.out.println("You need a hall ticket");
}
}
else {
System.out.println("You are not Registered");
}
}}
```

```
<terminated> if_else_ifladder [Java Application] C:\Program Files\
You can Write your Exam
```

7. Write a Java program to display the multiplication table of a number using a loop.

```
package ControlStatements;

import java.util.Scanner;

public class For_loop {

public static void main(String[] args) {


System.out.println("Table 17");
for(int i=1;i<=10;i++) {
System.out.println("17 * "+i+" ="+ "+17*i);
}
```

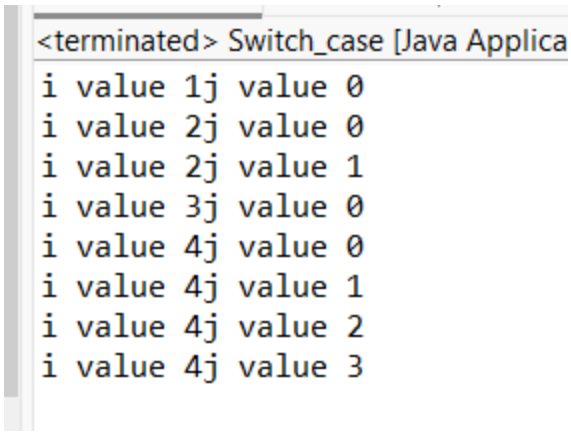
```
<terminated> For_loop [Java Application] C
Table 17
17 * 1 = 17
17 * 2 = 34
17 * 3 = 51
17 * 4 = 68
17 * 5 = 85
17 * 6 = 102
17 * 7 = 119
17 * 8 = 136
17 * 9 = 153
17 * 10 = 170
```

}}

8. How do you exit from nested loops in Java?

Using the break statement.

```
package ControlStatements;

public class Switch_case {

public static void main(String[] args) {


            for(int i=0;i<5;i++)
            {
            for(int j=0;j<i;j++) {
            System.out.println("i value "+i+"j value "+j);
            if(i==3) {
            break;
            }
            }
            }


            }

            }
```



9. Compare and contrast for, while, and do-while loops.

Forloop is used when the number of iterations is known in prior.

While is used when no of iteration to be iterated is unknown.

Do while is used to execute the loop atleast once.

10. Write a program that uses a switch-case to simulate a basic calculator.

```
package ControlStatements;

import java.util.Scanner;

public class Switch_case {

public static void main(String[] args) {

            System.out.println("Choose opeariton 1.Addition 2.Subtraction 3.Division
            4.Multiplication");
            Scanner sc=new Scanner(System.in);
            int a=5,b=10;
            int op=sc.nextInt();
            switch(op) {
            case 1:
            System.out.println("Addition is"+(a+b));
            break;
            case 2:
            System.out.println("Subtraction is"+(a-b));
            break;
            case 3:
```

```
System.out.println("Division is"+(a/b));
break;
case 4:
System.out.println("Multiplication is"+(a*b));
break;
default:
System.out.println("Invalid operation");
}


}

}
```

```
<terminated> Switch_case [Java Application] C:\Program Files\Java\jdk-20\bin\j
Choose opeariton 1.Addition 2.Subtraction 3.Division 4.M
1
Addition is15
```

6. What is the use of the `instanceof` keyword in Java?

The instanceof operator checks if an object is an instance of a class/interface.

```
Object obj = "Hello";
if (obj instanceof String) {
    System.out.println("obj is a String");
}
```

7. Explain the difference between `==` and `.equals()` in Java.

== Compares memory addresses "hello" == "hello" → false

.equals() Compares actual strings "hello".equals("hello") → true

8. Write a program using the ternary operator.

```
int a = 10, b = 20;
```

```
String res = (a > b) ? "a is larger" : "b is larger";
System.out.println(res);
```

9. What is the use of `this` and `super` in method overriding?

This calls the current class method

Super calls the parent class method

10. Explain bitwise operators with examples.

&	5&2	0101&0001	0001(1)
|	5|2	0101|0001	0111(7)
^	5^3	0101&0011	0110(1)