جامعة الأميرة
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CS110T:

Programming Language1

Lab 3: Java basics II

Lab Objectives:

In this lab, the student will practice:

- ✓ Defining variables of different data types ✓ Using format specifiers in printing output ✓ Compiling and executing Java applications.
- ✓ Writing and evaluating mathematical expressions

Lab Exercise 1: Program Output

Problem Description: What is the output of the following code?

```
// Lab Exercise 1: Math.java
// Computing and displaying the result of different expressions public
class Math
{
   // main method begins execution of Java application     public
static void main( String args[] )
   {
     System.out.println("8" + 6 + 6);
     System.out.println(6 + "6" + 6);
     System.out.println(6+ 6 + "6");

     System.out.println("4.5+1="+(4.5+1));
     System.out.println("4.0+9="+4.0+9);
     System.out.print("((2-2) × 1×3) - 3/1.0=-3.0");
     System.out.println(((2-2)*1*3)-3/1.0);
   }
}
```

866 // "8" + 6 + 6 = string concatenation

666 // 6 + "6" + 6 = string concatenation

126 // 6 + 6 + "6" = 12 + "6" = "126"

4.5+1=5.5 // "4.5+1=" + (4.5+1) = string + calculation

4.0+9=4.09 // "4.0+9=" + 4.0 + 9 = string concatenation

((2-2) × 1×3) - 3/1.0=-3.0-3.0 // Text + calculation result (-3.0)

Lab Exercise 2: Java statements (code writing 1)

A)Problem Description: Write Java statements that accomplish the following:

1. Declare a variable named *Student_ID* and assign value 4460001 to it.
2. Create a variable named *Student_Name* and assign the value Sara to it.
3. Create a variable named *Hours* and assign the value 23 to it.
4. Decrease the variable Hours by 3.
5. By using *printf* method and escape characters, Display the *Student_ID* and *Student_Name* and *Hours* as shown:

```
run:
Student ID        4460001
Student Name      Sara
Student Hours     20
BUILD SUCCESSFUL (total time: 0 seconds)
```

```
public class StudentInfo {
   public static void main(String[] args) {
// 1. Declare Student_ID variable       int
Student_ID = 4460001;

      // 2. Create Student_Name variable
      String Student_Name = "Sara";

      // 3. Create Hours variable
int Hours = 23;

      // 4. Decrease Hours by 3
      Hours -= 3;

      // 5. Display using printf
      System.out.printf("Student ID: %d%n", Student_ID);
      System.out.printf("Student Name: %s%n", Student_Name);
      System.out.printf("Hours: %d%n", Hours);
   }
}
```

B) Problem Description: Write Java statements that accomplish the following:

1. Declare a variable named *CourseCode* and assign value *CS110* to it.
2. Create a variable named *CourseName* and assign the value *Programming Language* to it.
3. Create a constant variable named *C_HOURS* and assign the value 3 to it.
4. Display the *CourseNum* and *CourseName* and *C_HOURS* using *printf method* and escape characters as shown:

```
run:
                CourseName:"Programming Language" CourseCode:"CS110"
                                CousreHours:"3"
BUILD SUCCESSFUL (total time: 0 seconds)
```

```
public class CourseInfo {
   public static void main(String[] args) {
      // 1. Declare CourseCode variable
      String CourseCode = "CS110";

      // 2. Create CourseName variable
      String CourseName = "Programming Language";

      // 3. Create constant C_HOURS
final int C_HOURS = 3;

      // 4. Display using printf
      System.out.printf("\t\tCourseName:\"%s\" CourseCode:\"%s\"%n", CourseName,
CourseCode);
      System.out.printf("\t\t\t\tCousreHours:\"%d\"%n", C_HOURS);    }
}
```

C) Problem Description: Write Java statements that accomplish the following:

1. Declare a variable named *BookPrice* and assign value 120 to it.
2. Create a variable named *BookName* and assign the value *AtomicHabits* to it.
3. Create a variable named *TAX* and assign the value 0.15 to it.
4. Calculate the *BookPrice* after adding the tax.
5. By using *printf* method and escape characters, Display the *BookName* and *BookPrice* as shown:

```
run:
        Book Name:AtomicHabits
        book price:138
BUILD SUCCESSFUL (total time: 0 seconds)
```

```
public class BookInfo {
   public static void main(String[] args) {
// 1. Declare BookPrice variable
double BookPrice = 120;

      // 2. Create BookName variable
      String BookName = "AtomicHabits";

      // 3. Create TAX variable
double TAX = 0.15;

      // 4. Calculate BookPrice after adding tax       double
priceAfterTax = BookPrice + (BookPrice * TAX);

      // 5. Display using printf
System.out.printf("Book Name: %s%n", BookName);

      System.out.printf("Book price:  %.2f" , priceAfterTax);     }
}
```

Lab Exercise 3: Java statements (code writing 2)

Problem description: Imagine you are developing a simple inventory management system for a bookstore. The bookstore keeps track of the number of books available and the price of each book. Write a Java program that:

1. Takes the total number of books in stock (an integer) and the price of a single book (a double) as input.

2. Casts the price of the book to an integer, representing the price in whole dollars.
3. Prints the original number of books, the original price, and the casted price (in whole dollars) using `System.out.println()` statements.

Example Scenario:

- The bookstore has 125 books in stock.
- Each book is priced at $19.99.

Output:

```
Total books in stock: 125
Original price of each book: 19.99
Price rounded to whole dollars: 19
```

```
import java.util.Scanner;

public class BookstoreInventory {
public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // 1. Take input for books and price
        System.out.print("Enter total number of books in stock: ");
int totalBooks = scanner.nextInt();

        System.out.print("Enter price of each book: ");
double bookPrice = scanner.nextDouble();

        // 2. Cast price to integer (whole dollars)
int wholeDollarPrice = (int) bookPrice;

        // 3. Print results
        System.out.println("Total books in stock: " + totalBooks);
        System.out.println("Original price of each book: " + bookPrice);
        System.out.println("Price rounded to whole dollars: " + wholeDollarPrice);

        scanner.close();
    }
}
```

Lab Exercise 4: Code writing (4)

Problem description: You are creating a simple program for a library to generate library cards for new members. The library card should display the member's full name, a unique ID number, and a welcome message. Write a Java program that:

1. Takes the member's first name, last name, and a unique ID number (an integer) as input.
2. Concatenates the first name and last name to form the full name.

3. Constructs a welcome message using string concatenation that includes the member's full name and their unique ID.
4. Prints the full name and the welcome message using `System.out.println()`.

Example Scenario: (You can use your own name**)**

- The member's first name is "Fatimah".
- The member's last name is "Ahmed".
- The unique ID is 12678.

Requirements:

- Use string concatenation to combine the first name and last name.
- Use string concatenation to create the welcome message.
- Use System.out.println() to display the results.

Output:

```
Full name: Fatimah Ahmed
Welcome message: Welcome, Fatimah Ahmed! Your library ID is 12345.
```

```
import java.util.Scanner;

public class LibraryCard {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // 1. Take input from user
        System.out.print("Enter first name: ");
        String firstName = scanner.nextLine();

        System.out.print("Enter last name: ");
        String lastName = scanner.nextLine();

        System.out.print("Enter unique ID: ");
int uniqueID = scanner.nextInt();

        // 2. Concatenate first and last name
        String fullName = firstName + " " + lastName;

        // 3. Construct welcome message
        String welcomeMessage = "Welcome, " + fullName + "! Your library ID is " + uniqueID + ".";

        // 4. Print results
        System.out.println("Full name: " + fullName);
        System.out.println("Welcome message: " + welcomeMessage);

        scanner.close();
    }
}
```

Lab3 Assignment Problems

Problem Description1: You are developing a weather app that provides temperature updates. The app tracks the current temperature in Fahrenheit (a double) and needs to convert it to Celsius (an integer). Write a Java program that:

1. Takes the current temperature in Fahrenheit as input.
2. Converts the temperature to Celsius using the formula C = (F - 32) * 5/9.
3. Casts the Celsius temperature to an integer.
4. Prints the original temperature in Fahrenheit, the converted temperature in Celsius (before casting), and the casted temperature (as an integer) using System.out.println() statements.

Example Scenario:

- The current temperature is 77.5°F.

Output

```
Original temperature in Fahrenheit: 77.5
Converted temperature in Celsius: 25.27777777777778  Celsius temperature
rounded to whole number: 25
```

```
import java.util.Scanner;

public class TemperatureConverter {
public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);

      // 1. Take temperature input
      System.out.print("Enter temperature in Fahrenheit: ");
double fahrenheit = scanner.nextDouble();

      // 2. Convert to Celsius      double
celsius = (fahrenheit - 32) * 5/9;

      // 3. Cast to integer
      int celsiusInt = (int) celsius;

      // 4. Print results
      System.out.println("Original temperature in Fahrenheit: " + fahrenheit);
      System.out.println("Converted temperature in Celsius: " + celsius);
      System.out.println("Celsius temperature rounded to whole number: " + celsiusInt);

      scanner.close();
   }
}
```

Problem Description2: Consider the following Java code and predict the output for each of the casting operations:

1. What will be the output of casting the double value 9.78 to an int?
2. What will be the output of casting the int value 100 to a byte?
3. What will be the output of casting the long value 150L to a float?
4. What will be the output of casting the char value 'A' to an int?

```
public class CastingExample {      public
static void main(String[] args) {
double dValue = 9.78;          int iValue =
(int) dValue;

        int num = 100;
        byte bValue = (byte) num;

        long lValue = 150L;
        float fValue = (float) lValue;

        char cValue = 'A';
int cToInt = (int) cValue;

        System.out.println("Original double value: " +
dValue);          System.out.println("Casted to int: " +
iValue);
        System.out.println("Original int value: " +
num);          System.out.println("Casted to byte: " +
bValue);
        System.out.println("Original long value: " + lValue);
        System.out.println("Casted to float: " + fValue);
        System.out.println("Original char value: " + cValue);
        System.out.println("Casted to int: " + cToInt);
    }
}
```

```
public class CastingExample {

public static void main(String[] args) {
 double dValue = 9.78;
  int iValue = (int) dValue;          // Output: 9 (truncates decimal)

      int num = 100;
 byte bValue = (byte) num;           // Output: 100 (fits in byte range)

      long lValue = 150L;
 float fValue = (float) lValue;       // Output: 150.0 (converts to float)

      char cValue = 'A';
int cToInt = (int) cValue;          // Output: 65 (ASCII value of 'A')

      System.out.println("Original double value: " + dValue);
      System.out.println("Casted to int: " + iValue);
      System.out.println("Original int value: " + num);
      System.out.println("Casted to byte: " + bValue);
      System.out.println("Original long value: " + lValue);
      System.out.println("Casted to float: " + fValue);
      System.out.println("Original char value: " + cValue);
      System.out.println("Casted to int: " + cToInt);
   }
}
```

Problem Description3: Complete the following code and write the output of code:

```
// Lab Exercise 1: Math.java
// Computing and displaying the result of different expressions public class
Math
{
   // main method begins execution of Java application    public
static void main( String args[] )
        {          myNum =
9;
                   myFloatNum =
8.99                myLetter = 'A';
     f;
                   myBool =      false;
                   myText = "Hello World";
                   System.out.println(myText);
                   System.out.println("4.0+9="+4.0+myNum);
                   System.out.print("((2-2) × 1×3) - 3/1.0= ");
     System.out.println(((2-2)*1*3)-3/1.0);
     System.out.println("(1+2)*3*4/5 ="+(1+2)*3*4/5);
   }   }
```

```
public class Math {
  public static void main(String[] args) {
// Complete the variable declarations
int myNum = 9;
 float myFloatNum = 8.99f;
 char myLetter = 'A';
boolean myBool = false;
     String myText = "Hello World";

     System.out.println(myText);                  // Output: Hello World
     System.out.println("4.0+9="+4.0+myNum);          // Output: 4.0+9=4.09 (string concatenation)
     System.out.print("((2-2) × 1×3) - 3/1.0= ");       // Output: ((2-2) × 1×3) - 3/1.0=
     System.out.println(((2-2)*1*3)-3/1.0);           // Output: -3.0
     System.out.println("(1+2)*3*4/5 ="+((1+2)*3*4/5));  // Output: (1+2)*3*4/5 =7 (integer division)
  }
}
```

Hello World

4.0+9=4.09
((2-2) × 1×3) - 3/1.0= -3.0
(1+2)*3*4/5 =7