**Java programming**

**Exercise 1 of 16**

**2206961**

**Cliff OMondi**

**Instructions:**

All programs should be written, and linked to an online repository like GitHub.

A video to get you started with GitHub has been posted on Moodle.

After completing your assignment, post the link on the link on Moodle. An instructor will follow the posted link to access and grade your work.

Note that: Your program should always be well-commented. At the top of your source code file, you should write a short description of what your program does and add other comments to help in explaining your code.

All of your variables should be given a deceptive name. Avoid giving your variables names like a, b, I, x, y etc.

In case you copy your friend's work, you both get a Zero (0).

**Section 1:**

1. Explain the differences between primitive and reference data types.

Primitive data types are basic building blocks of data in programming, and they include data types such as integers, floating-point numbers, characters, and boolean values. Reference data types, on the other hand, are complex data types that can contain other data types, including other reference data types. They are considered complex because they can be broken down into smaller components.

1. Define the scope of a variable (hint: local and global variable)

The scope of a variable refers to the region of the program where the variable defined and can be accessed.

A local variable is defined within a specific block of code, such as a function, loop, or conditional statement. defined, and it is not accessible outside of that block.

A global variable, on the other hand, is defined outside of any function or block of code.

1. Why is initialization of variables required.

Initialization of variables is required to ensure that it has a value assigned to it when it is created, privet null pointer exceptions or other retime errors, and make the code more readable and understandable

1. Differentiate between static, instance and local variables.

Static variables are shared by all instance of a class, instance variable are associated with a specific instance of a class, and local variables have a limited scope within a specific block or method.

1. Differentiate between widening and narrowing casting in java.

Widening casting involves automatically converting a value of a smaller data type to a larger data type, while narrowing casting involves explicitly converting a value of a large data type to a smaller datatype. Widening casting is typically used when assigning a value to a variable of a larger data type, while narrowing casting is typically used when assigning a value to a variable of a smaller data type.

1. the following table shows data type, its size, default value and the range. Filling in the missing values.

|  |  |  |  |
| --- | --- | --- | --- |
| **TYPE** | **SIZE (IN BYTES)** | **DEFAULT** | **RANGE** |
| boolean | 1 bit | False | true, false |
| Char | 2 bytes |  | ‘\0000’ to ‘\ffff’ |
| Byte | 1 byte | 0 | -128 to 127 |
| Short | 2 bytes | 0 | -215 to +215-1 |
| Int | 4 bytes | 0 | -2^31 to 2^31-1 |
| Long | 8 bytes | 0L | - 2^31 to 2^63-1 |
| Float | 4 bytes | 00.0f | -3.4e38 to 1.2e28 |
| Double | 8 bytes | 0.0d | -1.8E+308 to +1.8E+308 |

1. Define class as used in OOP

Object-oriented programming is a blueprint or templet for creating object. And this allow for code reusability, modularity and encapsulation

1. Explain the importance of classes in Java programming.

**Code reusability:** This allow one to define a blueprint for creating objects with similar behavior

**Modularity:** Classes promote modularity by allowing you to organize your code into separate files, each containing a single class.

**Polymorphism:** Class support this which means that objects of different classes can be treated as object of different classes can treated as object of their parent class.

Section 2:

1. Write a Java program that asks the user to enter their sur name and current age then print the number of characters of their sir name and even or odd depending on their age number.

Example of Expected result:

If sir name is Saruni and age is 29, output will be;

then the number of characters is 6.

Your current age is an odd number

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

// Ask the user to enter their surname

System.out.print("Enter your surname: ");

String surname = scanner.nextLine();

// Ask the user to enter their current age

System.out.print("Enter your current age: ");

int age = scanner.nextInt();

// Calculate the number of characters in the surname

int surnameLength = surname.length();

// Determine if the age is even or odd

String ageType = (age % 2 == 0) ? "even" : "odd";

// Print the results

System.out.println("The number of characters in your surname is: " + surnameLength);

System.out.println("Your current age is an " + ageType + " number");

}

}

1. Write Java program to ask student to enter the marks of the five units they did last semester, compute the average and display it on the screen. (Average should be given in two decimal places).

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

// Create a Scanner object to read input from the user

Scanner scanner = new Scanner(System.in);

// Array to store the marks of five units

double[] marks = new double[5];

double sum = 0;

// Prompt the student to enter marks for five units

for (int i = 0; i < 5; i++) {

System.out.print("Please enter the marks for unit " + (i + 1) + ": ");

marks[i] = scanner.nextDouble();

sum += marks[i]; // Add the mark to the sum

}

// Calculate the average

double average = sum / 5;

// Display the average with two decimal places

System.out.printf("The average marks of the five units is: %.2f%n", average);

}

}

2.Write a program that will help kids learn divisibly test of numbers of integers. The program should check whether the given integer is divisible by integers in the range of 0-9. For example, if a number (955) is divisible by five, the program should print, the number is divisible by 5 because it ends with a 5, and 900 is divisible by 5 because it ends with a 0(zero).

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

// Create a Scanner object to read input from the user

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter an integer

System.out.print("Please enter an integer: ");

int number = scanner.nextInt();

// Loop through the range of 1 to 9

for (int i = 1; i <= 9; i++) {

if (isDivisible(number, i)) {

System.out.println("The number " + number + " is divisible by " + i + ".");

// Additional explanation for divisibility by 5

if (i == 5) {

if (number % 10 == 0) {

System.out.println("This is because it ends with a 0.");

} else if (number % 10 == 5) {

System.out.println("This is because it ends with a 5.");

}

}

} else {

System.out.println("The number " + number + " is not divisible by " + i + ".");

}

}

}

// Method to check divisibility

public static boolean isDivisible(int number, int divisor) {

return number % divisor == 0;

}

}

1. Write a Java program to display all the multiples of 2, 3 and 7 within the range 71 to 15

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

// Create a Scanner object to read input from the user

Scanner scanner = new Scanner(System.in);

// Prompt the user to enter an integer

System.out.print("Please enter an integer: ");

int number = scanner.nextInt();

// Loop through the range of 1 to 9

for (int i = 1; i <= 9; i++) {

if (isDivisible(number, i)) {

System.out.println("The number " + number + " is divisible by " + i + ".");

// Additional explanation for divisibility by 5

if (i == 5) {

if (number % 10 == 0) {

System.out.println("This is because it ends with a 0.");

} else if (number % 10 == 5) {

System.out.println("This is because it ends with a 5.");

}

}

} else {

System.out.println("The number " + number + " is not divisible by " + i + ".");

}

}

}

// Method to check divisibility

public static boolean isDivisible(int number, int divisor) {

return number % divisor == 0;

}

}

Create a calculator using java to help user perform the basic operations (+, -, \* and /).

* 1. User should be asked to enter a number, then an operation, the program computes the operation and display the output to the computer screen.

public class Multiples {

public static void main(String[] args) {

System.out.println("Multiples of 2, 3, and 7 within the range 71 to 150:");

for (int i = 71; i <= 150; i++) {

if (i % 2 == 0 || i % 3 == 0 || i % 7 == 0) {

System.out.println(i);

}

}

}