**OOPS through Java**

**Chapter 01 : Programs and Solutions**

1. **Program to read a number from the user and print whether it is positive or negative.**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter a number: ");

int num = sc.nextInt();

if (num > 0) {

System.out.println(num + " is positive.");

} else if (num < 0) {

System.out.println(num + " is negative.");

} else {

System.out.println(num + " is neither positive nor negative.");

}

}

}

You will first import the scanner class to take input from user, then create an object of scanner, then use the nextInt() method to read the input from the user and store it in the variable "num". Then we will check the value of number is greater than 0 or not, if yes then it will print "number is positive" or if it is less than zero then it will print "number is negative" otherwise it will print "number is neither positive nor negative"

1. **Program to solve quadratic equations (use if, else if and else).**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter the coefficient of x^2: ");

double a = sc.nextDouble();

System.out.print("Enter the coefficient of x: ");

double b = sc.nextDouble();

System.out.print("Enter the constant: ");

double c = sc.nextDouble();

double discriminant = b \* b - 4 \* a \* c;

if (discriminant > 0) {

double root1 = (-b + Math.sqrt(discriminant)) / (2 \* a);

double root2 = (-b - Math.sqrt(discriminant)) / (2 \* a);

System.out.println("The roots are " + root1 + " and " + root2);

} else if (discriminant == 0) {

double root = -b / (2 \* a);

System.out.println("The root is " + root);

} else {

System.out.println("The equation has no real roots.");

}

}

}

You will first import the scanner class to take input from user, then create an object of scanner, then use the nextDouble() method to read the input from the user and store it in the variables a, b, c. Then we will calculate discriminant using the formula bb-4a\*c. Then we will check if discriminant is greater than 0, if yes then we will calculate the roots using the formula (-b + sqrt(discriminant)) / (2 \* a) and (-b - sqrt(discriminant)) / (2 \* a) and then we will print "The roots are root1 and root2"

if discriminant is equal to 0, then we will calculate the root using the formula -b / (2 \* a) and then we will print "The root is root" else if discriminant is less than 0 then it will print "The equation has no real roots."

1. **Take three numbers from the user and print the greatest number.**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter the first number: ");

int num1 = sc.nextInt();

System.out.print("Enter the second number: ");

int num2 = sc.nextInt();

System.out.print("Enter the third number: ");

int num3 = sc.nextInt();

if (num1 > num2 && num1 > num3) {

System.out.println("The greatest number is " + num1);

} else if (num2 > num1 && num2 > num3) {

System.out.println("The greatest number is " + num2);

} else {

System.out.println("The greatest number is " + num3);

}

}

}

You will first import the scanner class to take input from user, then create an object of scanner, then use the nextInt() method to read the input from the user and store it in the variables num1, num2, num3. Then we will check if num1 is greater than num2 and num3, if yes then we will print "The greatest number is num1"

if num2 is greater than num1 and num3, then we will print "The greatest number is num2" else if num3 is greater than num1 and num2 then it will print "The greatest number is num3".

1. **Program that keeps a number from the user and generates an integer between 1 and 7 and displays the name of the weekday.**

import java.util.Scanner;

import java.util.Random;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

Random rand = new Random();

System.out.print("Enter a number: ");

int num = sc.nextInt();

int day = rand.nextInt(7) + 1;

switch (day) {

case 1:

System.out.println("Monday");

break;

case 2:

System.out.println("Tuesday");

break;

case 3:

System.out.println("Wednesday");

break;

case 4:

System.out.println("Thursday");

break;

case 5:

System.out.println("Friday");

break;

case 6:

System.out.println("Saturday");

break;

case 7:

System.out.println("Sunday");

break;

default:

System.out.println("Invalid day");

}

}

}

You will first import the scanner class to take input from user, and Random class to generate random number. Then create an object of scanner, then use the nextInt() method to read the input from the user and store it in the variable "num" but this input is not used in this program. Then you will create object of Random class and use nextInt(7) + 1 to generate a random integer between 1 and 7, and store it in the variable "day" then using switch statement, you will check the value of day, if day is 1, then it will print Monday, if day is 2, then it will print Tuesday and so on.

1. **Program that reads in two floating-point numbers and tests whether they are the same up to three decimal places.**

import java.util.Scanner;

import java.text.DecimalFormat;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

DecimalFormat df = new DecimalFormat("#.###");

System.out.print("Enter the first number: ");

double num1 = sc.nextDouble();

System.out.print("Enter the second number: ");

double num2 = sc.nextDouble();

String num1Rounded = df.format(num1);

String num2Rounded = df.format(num2);

if (num1Rounded.equals(num2Rounded)) {

System.out.println("The numbers are the same up to three decimal places.");

} else {

System.out.println("The numbers are not the same up to three decimal places.");

}

}

}

You will first import the scanner class to take input from user, and DecimalFormat class to format the float number to three decimal places. Then create an object of scanner, then use the nextDouble() method to read the input from the user and store it in the variables num1, num2. Then you will create object of DecimalFormat class and use the format method to format the numbers to three decimal places and store it in the variables num1Rounded, num2Rounded. Then you will use an if statement to check whether the two formatted numbers are equal or not, if they are equal, it will print "The numbers are the same up to three decimal places." else it will print "The numbers are not the same up to three decimal places."

1. **Program that takes a year from user and print whether that year is a leap year or not.**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter a year: ");

int year = sc.nextInt();

boolean isLeap = false;

if(year % 4 == 0)

{

if( year % 100 == 0)

{

if ( year % 400 == 0)

isLeap = true;

else

isLeap = false;

}

else

isLeap = true;

}

else {

isLeap = false;

}

if(isLeap==true)

System.out.println(year + " is a leap year.");

else

System.out.println(year + " is not a leap year.");

}

}

You will first import the scanner class to take input from user, then create an object of scanner, then use the nextInt() method to read the input from the user and store it in the variable "year". Then, using an if-else statement, you will check if the year is divisible by 4, if yes then check if it is divisible by 100, if yes then check if it is divisible by 400, if yes then it is leap year otherwise it is not a leap year, if it is not divisible by 4 then it is not a leap year. If a year is a leap year then it will print "year is a leap year" otherwise it will print "year is not a leap year"

1. **Program to display the first 10 natural numbers.**

public class Main {

public static void main(String[] args) {

for (int i = 1; i <= 10; i++) {

System.out.println(i);

}

}

}

You will use a for loop, where you will initialize a variable i with 1, and in the condition part you will check if i is less than or equal to 10, which is the range of numbers you want to print. And in the increment part of for loop, you will increment i by 1 each time the loop runs. So the loop will run from 1 to 10 and print the value of i each time.

1. **Program to input 5 numbers from keyboard and find their sum and average.**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

int sum = 0;

for (int i = 1; i <= 5; i++) {

System.out.print("Enter a number: ");

int num = sc.nextInt();

sum += num;

}

double average = (double) sum / 5;

System.out.println("The sum of the numbers is: " + sum);

System.out.println("The average of the numbers is: " + average);

}

}

You will first import the scanner class to take input from user, then create an object of scanner. Then, you will use a for loop to take input from user 5 times, using nextInt() method of scanner class to read the input and store it in a variable 'num'. And then you will add this number to a variable 'sum' on each iteration. So after the for loop, the sum variable will have the sum of all the numbers entered by user. Then you will divide the sum of numbers by 5 to get the average of numbers. Finally you will print the sum and average of numbers.

1. **Program in Java to display the multiplication table of a given integer**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter an integer: ");

int num = sc.nextInt();

for (int i = 1; i <= 10; i++) {

System.out.println(num + " x " + i + " = " + num\*i);

}

}

}

You will first import the scanner class to take input from user, then create an object of scanner, then use the nextInt() method to read the input from the user and store it in the variable "num". Then, you will use a for loop to iterate from 1 to 10, and on each iteration, you will calculate the product of the input number and the current iteration number (i) by using the expression num\*i, and then you will print the result. This way you can display the multiplication table of the input number up to 10.

You can change the range of the multiplication table by changing the values in the for loop.

1. **Program in Java to display the pattern like right angle triangle with a number.**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter a number: ");

int num = sc.nextInt();

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

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

System.out.print(num);

}

System.out.println();

}

}

}

You will first import the scanner class to take input from user, then create an object of scanner, then use the nextInt() method to read the input from the user and store it in the variable "num". Then, you will use two nested for loops to create the triangle pattern. The outer for loop will iterate from 1 to the input number, and the inner for loop will iterate from 1 to the current iteration of the outer for loop. On each iteration of the inner loop, you will print the input number, and on each iteration of the outer loop, you will move to the next line. This way, you can display the pattern of a right-angled triangle made of the input number.

You can change the character or number used to build the pattern by changing the value in the inner for loop.