

# Faculty of Computing

## IT1120 – Introduction to Programming

### Year 1 Semester 1 (2024)

#### Tutorial 09

---

##### Question 1

The roots of a function can be calculated as given below.

$$x = \frac{-b \mp \sqrt{b^2 - 4ac}}{2a}$$

Write a pseudocode to input any three values for  $a$ ,  $b$ ,  $c$  and to calculate the roots.

Hint: Use *pow()* and *sqrt()* methods in Java Math class.

##### MAIN

```
// Declare variables
DEFINE a, b, c AS DOUBLE
DEFINE root1, root2 AS DOUBLE
DEFINE discriminant AS DOUBLE

// Input values for a, b, and c
PRINT "Enter the value of a: "
INPUT a
PRINT "Enter the value of b: "
INPUT b
PRINT "Enter the value of c: "
INPUT c
```

```
// Calculate the discriminant
```

```
discriminant = Math.pow(b,2) - (4 * a * c)
```

```
root1 = (-b + Math.sqrt(discriminant)) / (2 * a)
```

```
root2 = (-b - Math.sqrt(discriminant)) / (2 * a)
```

```
PRINT "Two roots: ", root1, " and ", root2
```

```
ENDMAIN
```

## Question 2

Write a pseudocode method called **circleArea()** that take the radius of a circle as an argument / parameter, then calculate area and return the area.

In the Main Method, read the radius value as an user input via keyboard, then call the **circleArea()** method to display the result.

**// Method to calculate area of circle**

**FUNCTION circleArea(DEFINE radius AS FLOAT):**

**DEFINE area AS FLOAT**

**area = 22/7.0 \* radius \* radius**

**RETURN area**

**END FUNCTION**

**// Main method**

**MAIN**

**// Input radius from user**

**PRINT "Enter the radius of the circle: "**

**INPUT radius**

**// Call circleArea method to calculate the area**

**area = circleArea(radius)**

**// Output the result**

**PRINT "The area of the circle is: ", area**

**ENDMAIN**

### Question 3

Write three Java methods do the following

- **add()** – add two integers pass as parameters and return the result
- **multiply()** – multiply two integers pass as parameters and return the result
- **square()** – receive an integer as a parameter and return the result after multiplying the number by itself

Use the above methods in the Main Method to calculate the result of the following mathematical expressions:

i.  $(3 * 4 + 5 * 7)^2$

ii.  $(4 + 7)^2 + (8 + 3)^2$

**// Method to add two integers**

**FUNCTION add(x, y):**

**RETURN x + y**

**END FUNCTION**

**// Method to multiply two integers**

**FUNCTION multiply(x, y):**

**RETURN x \* y**

**END FUNCTION**

**// Method to square an integer**

**FUNCTION square(x):**

**RETURN x \* x**

**END FUNCTION**

```
// Main method to calculate expressions
```

```
MAIN
```

```
DEFINE result1, result2 AS INTEGER
```

```
// Calculate  $(3 * 4 + 5 * 7)^2$ 
```

```
result1 = square(add(multiply(3, 4), multiply(5, 7)))
```

```
// Calculate  $(4 + 7)^2 + (8 + 3)^2$ 
```

```
result2 = add(square(add(4, 7)), square(add(8, 3)))
```

```
// Output results
```

```
PRINT "Result of  $(3 * 4 + 5 * 7)^2$ : ", result1
```

```
PRINT "Result of  $(4 + 7)^2 + (8 + 3)^2$ : ", result2
```

```
ENDMAIN
```

```
public class MathOperations
{
    // Method to add two integers
    public static int add(int x, int y)
    {
        return x + y;
    }

    // Method to multiply two integers
    public static int multiply(int x, int y)
    {
        return x * y;
    }

    // Method to square an integer
    public static int square(int x)
    {
        return x * x;
    }

    // Main method to calculate expressions
    public static void main(String[] args)
    {
        int result1, result2;

        // Calculate (3 * 4 + 5 * 7)^2
        result1 = square(add(multiply(3, 4), multiply(5, 7)));
    }
}
```

```
// Calculate  $(4 + 7)^2 + (8 + 3)^2$   
result2 = add(square(add(4, 7)), square(add(8, 3)));  
  
// Output results  
System.out.println("Result of  $(3 * 4 + 5 * 7)^2$ : " + result1);  
System.out.println("Result of  $(4 + 7)^2 + (8 + 3)^2$ : " + result2);  
}  
}
```

#### Question 4

Write a pseudocode to calculate the Final Mark and Grade of 5 students for a subject.

- a) Write a method called **calcFinalMark()** to calculate the final mark of the subject. When calculating the final mark, 30% is taken from the assignment mark and 70% is taken from the exam paper mark.

Method should return the final mark when assignment mark and exam paper mark are given as parameters to the method.

- b) Write a method called **findGrades()** to return the grade obtained for the given final mark.

Grades are calculated as follows:

Final Mark	Grade
mark $\geq$ 75	A
60 $\leq$ mark < 75	B
50 $\leq$ mark < 60	C
mark < 50	F

- c) Write a method called **printDetails()** to print the Name, Final Mark and Grade of a student.

Your output should be as follows:

Name	Final Mark	Grade
.....	.....	.....
.....	.....	.....
.....	.....	.....

- d) In Main Method, ask the user to enter the **Name, Assignment Mark** (out of 100) and the **Exam Paper Mark** (out of 100) of the 5 students from the keyboard.

Display the Name, Final Mark and Grade of a student.

Hint: Use the methods written in section b) and c)



// Method to calculate final mark

**FUNCTION** calcFinalMark(**DEFINE** assignmentMark **AS FLOAT**, **DEFINE** examMark **AS FLOAT**):

**DEFINE** finalMark **AS FLOAT**

finalMark = (0.3 \* assignmentMark) + (0.7 \* examMark)

**RETURN** finalMark

**END FUNCTION**

// Method to determine grade based on final mark

**FUNCTION** findGrades(**DEFINE** finalMark **AS FLOAT**):

**IF** finalMark >= 75 **THEN**

**RETURN** 'A'

**ELSE IF** finalMark >= 60 **THEN**

**RETURN** 'B'

**ELSE IF** finalMark >= 50 **THEN**

**RETURN** 'C'

**ELSE**

**RETURN** 'F'

**ENDIF**

**END FUNCTION**

// Method to print student details

**FUNCTION** printDetails(**DEFINE** name **AS STRING**, **DEFINE** finalMark **AS FLOAT**, **DEFINE** grade **AS CHAR**):

**PRINT** name, finalMark, grade

**END FUNCTION**

```
// Main method
```

```
MAIN
```

```
DEFINE names[5] AS STRING
```

```
DEFINE assignmentMarks[5] AS FLOAT
```

```
DEFINE examMarks[5] AS FLOAT
```

```
DEFINE finalMark, assignmentMark, examMark AS FLOAT
```

```
DEFINE grade AS CHAR
```

```
// Input data for each student
```

```
FOR i =1 TO 5
```

```
PRINT "Enter the name of student ", i, ": "
```

```
INPUT names[i]
```

```
PRINT "Enter the assignment mark (out of 100): "
```

```
INPUT assignmentMarks[i]
```

```
PRINT "Enter the exam paper mark (out of 100): "
```

```
INPUT examMarks[i]
```

```
i = i + 1
```

```
NEXT
```

```
// Display header
```

```
PRINT "Name\tFinal Mark\tGrade"
```

```
// Process and display results for each student
```

**FOR i = 1 TO 5**

**// Calculate final mark using calcFinalMark method**

**finalMark = calcFinalMark(assignmentMarks[i], examMarks[i])**

**// Determine grade using findGrades method**

**grade = findGrades(finalMark)**

**// Print details using printDetails method**

**printDetails(names[i], finalMark, grade)**

**i = i + 1**

**NEXT**

**ENDMAIN**