

## Assignment 5

### Summer Bootcamp in java

Total Marks: 100  
Due Date: 08 Aug 2024

Solution will be discussed in doubt sessions

## Swing GUI in java

This project aims to develop a comprehensive scientific calculator application using Java's Swing library for the graphical user interface (GUI) and the Math library for performing complex mathematical calculations. The calculator will provide a user-friendly interface for performing basic arithmetic operations, as well as advanced functions such as trigonometric, logarithmic, exponential, and statistical calculations.

### Functionality

- **Basic Arithmetic:** Addition, subtraction, multiplication, division.
- **Trigonometric Functions:** Sine, cosine, tangent, inverse trigonometric functions.
- **Logarithmic Functions:** Natural logarithm ( $\ln$ ), base-10 logarithm ( $\log$ ), exponential function.
- **Power and Root Functions:** Exponentiation, square root.
- **Statistical Functions:** Mean, median, mode, standard deviation.
- **User Interface:** Clear and organized layout, easy-to-use buttons, informative display.
- **Error Handling:** Graceful handling of invalid inputs and calculations.

### Technical Approach

- Use Java Swing components (JFrame, JPanel, JButton, JTextField, etc.) to create the calculator's GUI.
- Employ event listeners to handle button clicks and user input.
- Utilize the Java Math library for mathematical operations ( $\sin$ ,  $\cos$ ,  $\tan$ ,  $\log$ ,  $\text{pow}$ ,  $\text{sqrt}$ , etc.).
- Implement a robust calculation logic to process user input and perform calculations accurately.
- Consider using regular expressions or input validation to prevent invalid input.
- Provide clear and informative error messages for unexpected conditions.

### Expected Outcome

A functional scientific calculator application with a user-friendly interface capable of performing a wide range of mathematical calculations. The calculator should be reliable, efficient, and easy to use.