Test Plan

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CMSC115

Chapter 4, Project 1

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**Program Goals & Objectives**

The primary objective of this program is to calculate the area of a regular polygon based on user input for the number of sides and side length. The program implements a mathematical formula to compute the area accurately for any regular polygon.

**Program Functional Requirements**

1. The program should prompt the user to enter the number of sides (n) of a regular polygon.

- The user should be able to enter the number of sides as a positive integer.

- The program should validate that the entered number of sides is valid for a polygon (n ≥ 3).

2. The program should prompt the user to enter the length of one side (s) of the regular polygon.

- The user should be able to enter the side length as a positive decimal number.

3. The program should calculate the area of the regular polygon using the formula:

- area = (n × s²) ÷ [4 × tan(π ÷ n)]

4. The program should display the calculated area with 4 decimal places of precision.

\*\*Note:\*\* This program assumes all angles in the polygon are equal and all sides have the same length (regular polygon).

**Program Pseudocode**

START

DISPLAY "Enter the number of sided: "

READ number\_of\_sides

DISPLAY "Enter the length of a side: "

READ side\_length

SET area = (number\_of\_sides × side\_length²) ÷ (4 × tan(π ÷ number\_of\_sides))

DISPLAY "The area of the polygon is " + area (formatted to 4 decimal places)

END

**Program Flowchart**

**A diagram of a function

Description automatically generated**

**Table 1 – Traceability Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Case | Input/Output | Expected Result | Actual Result | Outcome  (Pass/Fail) |
| 1a | Enter the number of sides: 6 | Enter the length of a side: | Enter the length of a side: | Pass |
| 2a | Enter the number of sides: six | Enter the length of a side: | Exception in thread “main” java.util.InputMismatchException | Fail |
| 3a | Enter the number of sides: 6  Enter the length of a side: 4 | The area of the polygon is 41.5692 | The area of the polygon is 41.5692 | Pass |