Test Plan

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Chapter 5, Project 1

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**Program Goals & Objectives**

The primary objective of this program is to read an unspecified number of integers from the user until the user enters zero. The program then calculates and displays the following:

• The number of positive integers entered.

• The number of negative integers entered.

• The total sum of the entered integers (excluding the terminating zero).

• The average of the entered integers as a floating-point number.

This program is designed to practice loop constructs, conditional statements, and arithmetic operations in Java.

**Program Functional Requirements**

1. User Input
   1. The program should prompt the user to enter integers.
   2. The user can enter any number of integers.
   3. Input ends when the user enters zero (0).
2. Data Processing
   1. Count the number of positive integers entered (numbers greater than zero).
   2. Count the number of negative integers entered (numbers less than zero).
   3. Calculate the total sum of all entered integers (excluding the terminating zero).
   4. Compute the average of the entered integers as a floating-point number.
   5. Zeros are not counted in the total, positives, or negatives.
3. Special Condition Handling
   1. If the first number entered is zero, display a message stating that no numbers were entered except zero.
4. Output
   1. After input ends, display the following:
      1. The number of positives
      2. The number of negatives
      3. The total
      4. The average

**Program Pseudocode**

START

Create a Scanner object for input

Initialize positives to 0

Initialize negatives to 0

Initialize total to 0

Display "Enter an integer, the input ends if it is 0: "

Input number

IF number == 0 THEN

Display "No numbers are entered except 0"

EXIT

END IF

WHILE number != 0 DO

IF number > 0 THEN

positives = positives + 1

ELSE

negatives = negatives + 1

END IF

total = total + number

Input number

END WHILE

average = total / (positives + negatives)

Display "The number of positives is " + positives

Display "The number of negatives is " + negatives

Display "The total is " + total

Display "The average is " + average

Close Scanner

END

**Program Flowchart**

**A diagram of a number

Description automatically generated**

**Table 1 – Traceability Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Case | Input/Output | Expected Result | Actual Result | Outcome  (Pass/Fail) |
| 1a | Enter an integer, the input ends if it is 0: 0 | No numbers are entered except 0 | No numbers are entered except 0 | Pass |
| 2a | Enter an integer, the input ends if it is 0: -1.0 | Handle invalid input appropriately | Exception in thread "main" java.util.InputMismatchException | Fail |
| 3a | Enter an integer, the input ends if it is 0: 1  2  10  18  -4  -10  20  0 | The number of positives is 5  The number of negatives is 2  The total is 37.0  The average is 5.285714285714286 | The number of positives is 5  The number of negatives is 2  The total is 37.0  The average is 5.285714285714286 | Pass |