

Arfah Ali
FA21-BSE-080
LAB-04

Exercises for lab: Consider the following code and draw its CFG with defining its paths and check the whole code by white box testing:

Problem Statement:

Write a Java program that calculates the total discount for a shopping cart based on the total amount, number of items, whether it's a holiday, and whether the customer is a member.

Solution:

Code:

```
public double calculateTotalDiscount(double cartTotal, int itemCount,
    boolean isHoliday, boolean isMember) {
    double discount = 0.0;
    if (isHoliday) {
        if (cartTotal >= 100) {
            discount += 0.1;
        } else {
            discount += 0.05;
        }
    }

    if (isMember) {
        discount += 0.05;
    }

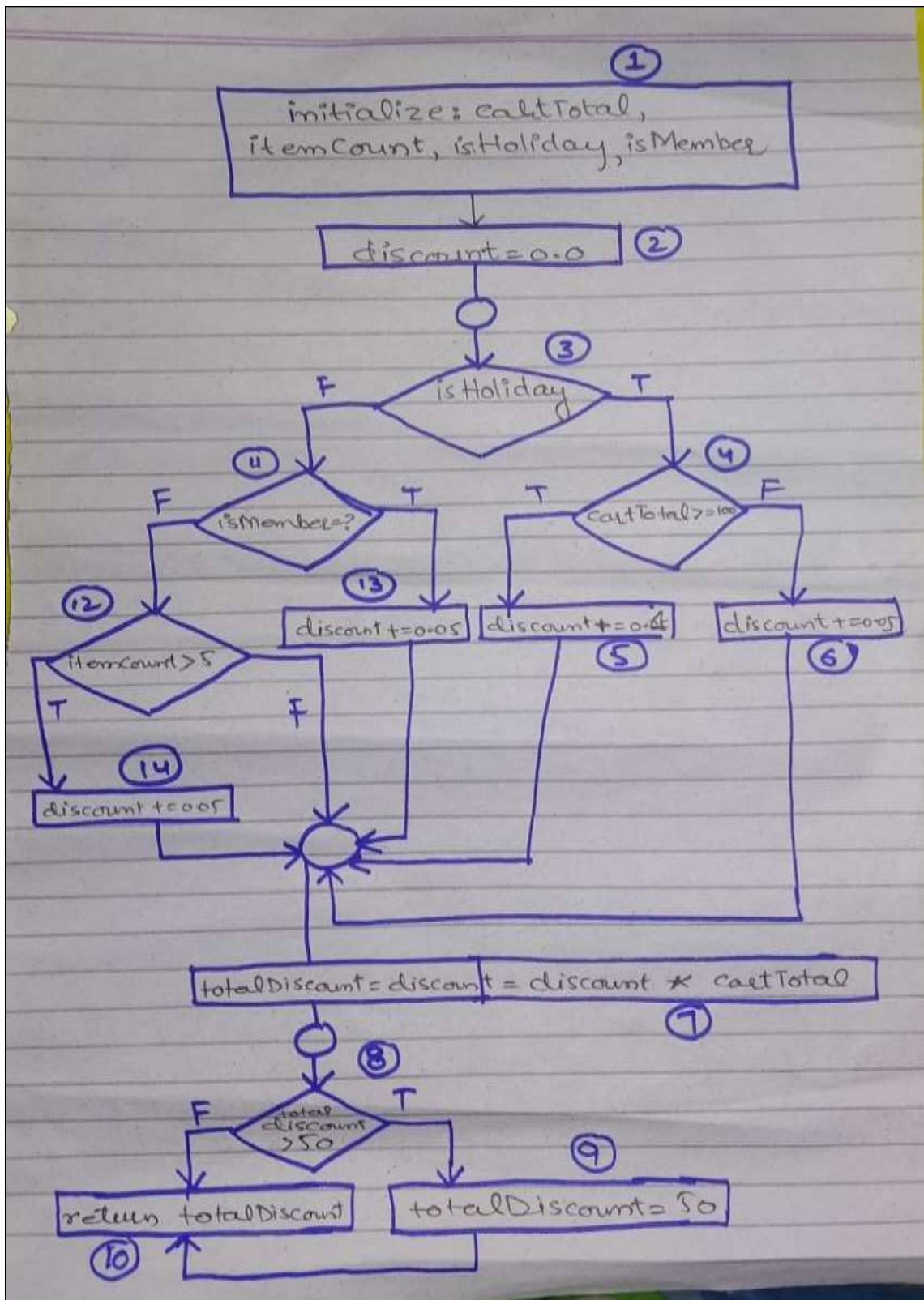
    if (itemCount > 5) {
        discount += 0.05;
    }

    double totalDiscount = discount * cartTotal;
    if (totalDiscount > 50) {
        totalDiscount = 50;
    }

    return totalDiscount;
}

public static void main(String[] args) {
    ShoppingCart cart = new ShoppingCart();
    double total = cart.calculateTotalDiscount(cartTotal: 120, itemCount: 6, isHoliday: true, isMember: true);
    System.out.println("Total discount: " + total);
}
```

CFG



Paths:

Path 1: 1-2 -3-4(T)-4(T)-6-7-8(T)-9(T)-10

Path 2: 1-2 -3-4(T)-4(F)-5-7-8(T)-9(T)-10

Path 3: 1-2 -3-4(T)-4(T)-6-7-8(F)- 10

Path 4: 1-2 -3-4(T)-4(F)-5-7-8(F)- 10

Path 5: 1-2-3(F) -11(T)-13-7-8(T)-9-10

Path 6: 1-2-3(F) -11(T)-13-7-8(F)-10

Path 7: 1-2-3(F) -11(T)-12(F)-7-8(T)-9-10

Path 8: 1-2-3(F) -11(T)-12(F)-7-8(F)-10

Path 9: 1-2-3(F) -11(F)-12(T)-7-8(T)-9-10

Path 10: 1-2-3(F) -11(T)-12(T)-7-8(F)-9-10

Test Cases:

Test Case ID	Test Case Description	Input Data (cartTotal, itemCount, isHoliday, isMember)	Expected Outcome	Actual Outcome (Predicted)	Status (Predicted)
TC1	Holiday, cart total ≥ 100 , member, item count ≤ 5 , total discount ≤ 50 .	(120, 5, true, true)	Total discount = 18	Total discount = 18	Passed
TC2	Holiday, cart total < 100 , member, item count ≤ 5 , total discount ≤ 50 .	(80, 5, true, true)	Total discount = 8	Total discount = 8	Passed
TC3	Holiday, cart total ≥ 100 , member, item count ≤ 5 ,	(600, 5, true, true)	Total discount = 50	Total discount = 50	Passed

	total discount > 50.				
TC4	Holiday, cart total < 100, member, item count ≤ 5, total discount > 50.	(800, 5, true, true)	Total discount = 50	Total discount = 50	Passed
TC5	Not a holiday, member, item count > 5, total discount ≤ 50.	(120, 6, false, true)	Total discount = 12	Total discount = 12	Passed
TC6	Not a holiday, member, item count > 5, total discount > 50.	(1100, 6, false, true)	Total discount = 50	Total discount = 50	Passed
TC7	Not a holiday, member, item count ≤ 5, total discount ≤ 50.	(100, 4, false, true)	Total discount = 5	Total discount = 5	Passed
TC8	Not a holiday, member, item count ≤ 5, total discount > 50.	(1200, 4, false, true)	Total discount = 50	Total discount = 50	Passed
TC9	Not a holiday, not a member, item count > 5, total discount ≤ 50.	(100, 7, false, false)	Total discount = 5	Total discount = 5	Passed