Lab # *4*

*Thomas Cheng*

*100 388 047*

CPSC 1150 - 003

Instructor: H. Darbandi

Lab Title:

Date submitted:, 2022

Department: CSIS

Program: Lab4

File Name: Lab4

Purpose:

To calculate the perimeter and the area of a triangle made from 3 points on a grid

Input: A(xA,yA), B(xB,yB), C(xC,yC),

Output: perimeter, area

Technical Information:

*(You should fill the following information based on compiler and computer you are using).*

IntelliJ IDEA 2022.1.1 (Community Edition)

Build #IC-221.5591.52, built on May 10, 2022

Runtime version: 11.0.14.1+1-b2043.45 aarch64

VM: OpenJDK 64-Bit Server VM by JetBrains s.r.o.

macOS 12.4

GC: G1 Young Generation, G1 Old Generation

Memory: 1024M

Cores: 8

Registry:

ide.balloon.shadow.size=0

Non-Bundled Plugins:

com.chrisrm.idea.MaterialThemeUI (7.5.2.2)

Kotlin: 221-1.6.21-release-337-IJ5591.52

Program Logic (Pseudocode)

Algorithm:

xA <- x of A

yA <- y of A

xB <- x of B

yB <- y of B

xC <- x of C

yC <- y of C

*InvalidMessageOutput*(xA, yA, xB, yB, xC, yC)

if *isLine*(xA, yA, xB, yB, xC, yC) is true then

print(wait this is a line!)

restart()

else

systemOutput()

repeat()

Methods:

repeat()

repeat the whole program

distance(xA, yA, xB, yB, xC, yC)

return distance of the given the points

area(xA, yA, xB, yB, xC, yC)

return the area of the triangle with the given coordinate

perimeter(xA, yA, xB, yB, xC, yC)

return the perimeter of the triangle with the given coordinate

isLine(xA, yA, xB, yB, xC, yC)

EPSILON <- 1.0E-10

mAB <- slope of line AB

mAC <-slope of AC

if AB and AC is vertical line the

return true

else

return abs(mAB-mAC) < EPSILON

systemOutput()

print(Triangle A(xA,yA), B(xB,yB), and C(xC,yC))

print(Perimeter: perimeter(xA, yA, xB, yB, xC, yC))

print(Area. :area(xA, yA, xB, yB, xC, yC))

repeat()

verify\_input (x, y)   
 *return* Boolean expression of X and Y [0,40]

*InvalidMessageOutput*(xA, yA, xB, yB, xC, yC)

create string invalidMessage  
*if* (!*verify\_input*(xA, yA)) then  
 add invalid message for A to invalidMessage  
  
*if* (!*verify\_input*(xB, yB)) then  
 add invalid message for B to invalidMessage  
*if* (!*verify\_input*(xC, yC)) then  
 add invalid message for C to invalidMessage

*if* (invalidMessage is not empty) then  
 print(invalidMessage);  
 *repeat*();

The test cases are created for this lab assignment for learning purpose. We will cover test cases in details later in our class, and you will create your own test cases starting from lab2.

Test case format used in this lab assignment

*purpose*

*input*

*output*

*expected value*

*passed or failed*

Test Cases:

Test case 1: valid points

A(5,5)

B(6,7)

C(8,5)

Output value:

Perimeter = 8.06449510224598

Area = 2.999999999999999

Expected value:

Perimeter = 8.06449510224598

Area = 2.999999999999999

Passed

Test case 2: invalid inputs

A(-1,0)

B(0,41)

C(7,41)

Output value:

coordinate (-1,0) is not in acceptable range

coordinate (0,41) is not in acceptable range

coordinate (7,41) is not in acceptable range

Expected value:

coordinate (-1,0) is not in acceptable range

coordinate (0,41) is not in acceptable range

coordinate (7,41) is not in acceptable range

Passed

Test case 3:vertical line

A(0,1)

B(0,2)

C(0,3)

Output value:

Wait... This is a line!

Expected value:

Wait... This is a line!

Passed

Test case 4: horizontal line

A(1,20)

B(2,20)

C(3,20)

Output value:

Wait... This is a line!

Expected value:

Wait... This is a line!

Passed

Test case 5: boundary values

A(0,40)

B(40,0)

C(0,0)

Output value:

Perimeter = 136.5685424949238

Area = 800.0

Expected value:

Perimeter = 136.5685424949238

Area = 800.0

Passed