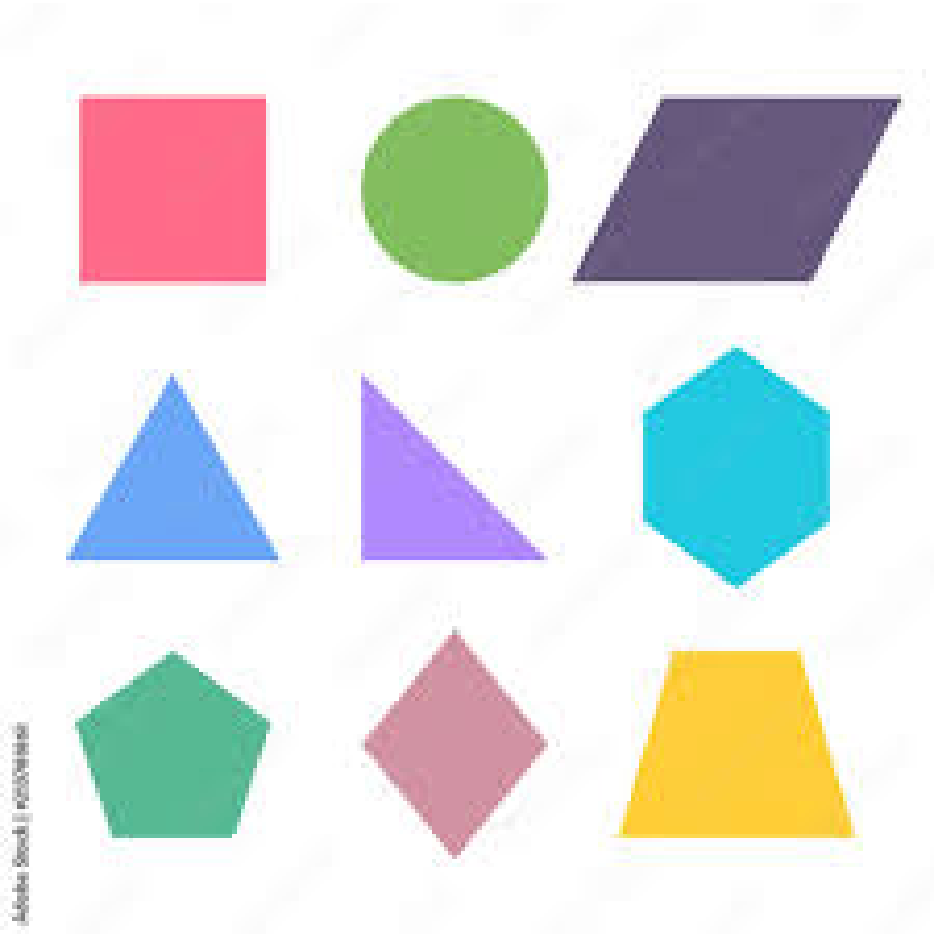
Software Testing and Analysis of Shapes.exe

Tests completed by Gavin Fors, Sean Kenney, and Aman Kikani



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Project Overview

In this project we test Shapes.exe using Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, and Robust Worst-Case Boundary Value Testing. We were able to complete the Normal Boundary and Robust Boundary testing by hand as there are much fewer test cases, but in order to complete the Worst-Case and Robust Worst-Case we created a program to run through each scenario in order to save time.

Test Plan

Boundary Value Testing:

For Boundary Value Testing, I opted to test using both variables to be set to the boundary values. This is effective as the variables interact with each other in the program- every test case multiplies A and B. If they were standalone variables, it would be necessary to compare each endpoint for A to each endpoint to B.

Robust Boundary Value Testing:

For Robust Boundary Value Testing, we can reuse all of the tests performed in boundary value testing. The two new tests added are the min -1 and max +1, which can be performed as established. The maximum value was determined by the square root of the largest integer allowed in c++, which is 2147488281, and the square root of this is 46341.

Worst Case Value Testing:

For Worst Case Value Testing, we opted to test rejecting single fault assumption and test the values of each variable non-independently of each other. This allowed up to see if there's a fault in the calculation while also making sure to see if we have a fault from the variables interacting with each other

Robust Worst Case Value Testing

For the robust worst case testing, we reused the results from the regular testing to reduce the redundancy and added the new tests which are one above and one below the old maxes/minimums

BVA Discussion

Boundary Value Analysis (BVA)

Boundary Value Testing and analysis is the process in which a tester goes through a program (one which is ideally a black box program) and performs testing on the variables themselves and the effect they have on each other to gain insight on what might break the program. This is done in 4 distinct ways. **1. Normal, 2. Robust, 3. Worst Case, 4. Robust Worst Case**. These four types of testing allow the testers to remove the vast majority of errors (~90%) with a minimal amount of testing. The amount of testing increases and clusters around the edge as you move from testing phase one to four. Since the majority of errors in a program reside around the edges, the first case tests the edges equally but as you go down to robust worst case, the edges are being tested a multitude of times more than priorly. Overall BVA allows the testers to be able to look at and test most programs while removing the majority of the bugs all without having to look at the original source code.

Test Cases

Boundary Value Testing

Minimum Value Testing

Test Case #000:

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides of value 0.

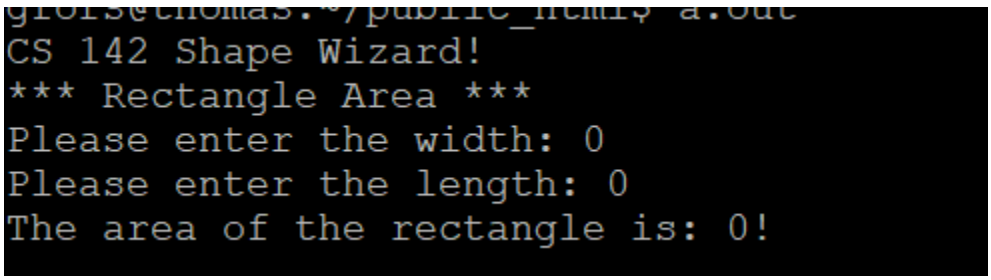
Preconditions: N/A

Inputs: 0

Expected Output: 0

Expected Postconditions: Square area calculation (see Test Case #001)

Execution History: Passed (9/25/24)



Test Case #001

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides of value 0

Preconditions: Rectangle Area Calculation (see Test Case #000)

Inputs: 0

Expected Output: 0

Expected Postconditions: Rhombus Area Calculation (see Test Case #002)

Execution History: Passed (9/25/24)

```
*** Square Area ***
Please enter the width: 0
Please enter the length: 0
The area of the square is: 0!
```

Test Case #002

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value 0

Preconditions: Square Area Calculation (see Test Case #001)

Inputs: 0

Expected Output: 0

Expected Postconditions: Triangle Area Calculation (see Test Case #003)

Execution History: Passed (9/25/24)

```
*** Rhombus Area ***
Please enter the diagonal: 0
Please enter the diagonal: 0
The area of the Rhombus is: 0!
```

Test Case #003

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value 0

Preconditions: Rhombus Area Calculation (see Test Case #002)

Inputs: 0

Expected Output: 0

Expected Postconditions: N/A

Execution History: Passed (9/25/24)

```
*** Triangle Area ***
Please enter the height: 0
Please enter the base: 0
The area of the Triangle is: 0!
```

Minimum Value +1 Testing

Test Case #004

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rectangle with sides of value 1

Preconditions: N/A

Inputs: 1

Expected Output: 1

Expected Postconditions: Square Area Calculation (see Test Case #005)

Execution History: Passed (9/25/24)

```
CS 142 Shape Wizard!
*** Rectangle Area ***
Please enter the width: 1
Please enter the length: 1
The area of the rectangle is: 1!
```

Test Case #005

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Square with sides of value 1

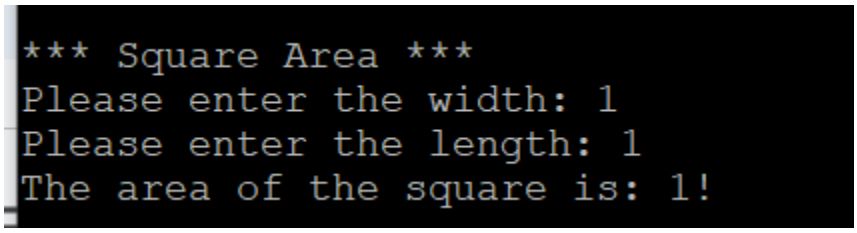
Preconditions: Rectangle Area Calculation (see Test Case #004)

Inputs: 1

Expected Output: 1

Expected Postconditions: Rhombus Area Calculation (see Test Case #006)

Execution History: Passed (9/25/24)



Test Case #006

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value 1

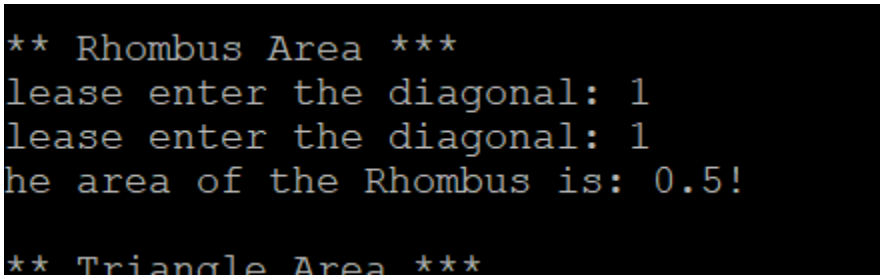
Preconditions: Square Area Calculation (see Test Case #005)

Inputs: 1

Expected Output: 0.5

Expected Postconditions: Triangle Area Calculation (see Test Case #007)

Execution History: Passed (9/25/24)



Test Case #007

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value 1

Preconditions: Rhombus Area Calculation (see Test Case #006)

Inputs: 1

Expected Output: 0.5

Expected Postconditions: N/A

Execution History: Passed (9/25/24)

```
*** Triangle Area ***
Please enter the height: 1
Please enter the base: 1
The area of the Triangle is: 0.5!
```

Nominal Value Testing

Test Case #008

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rectangle with sides of value 5

Preconditions: N/A

Inputs: 5

Expected Output: 25

Expected Postconditions: Square Area Calculation (see Test Case #009)

Execution History: Passed (9/25/24)

```
CS 142 Shape Wizard!
*** Rectangle Area ***
Please enter the width: 5
Please enter the length: 5
The area of the rectangle is: 25!
```

Test Case #009

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Square with sides of value 5

Preconditions: Rectangle Area Calculation (see Test Case #008)

Inputs: 5

Expected Output: 25

Expected Postconditions: Rhombus Area Calculation (see Test Case #010)

Execution History: Passed (9/25/24)

```
*** Square Area ***
Please enter the width: 5
Please enter the length: 5
The area of the square is: 25!
```

Test Case #010

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value 5

Preconditions: Square Area Calculation (see Test Case #009)

Inputs: 5

Expected Output: 12.5

Expected Postconditions: Triangle Area Calculation (see Test Case #011)

Execution History: Passed (9/25/24)

```
*** Rhombus Area ***
Please enter the diagonal: 5
Please enter the diagonal: 5
The area of the Rhombus is: 12.5!
```

Test Case #011

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value 5

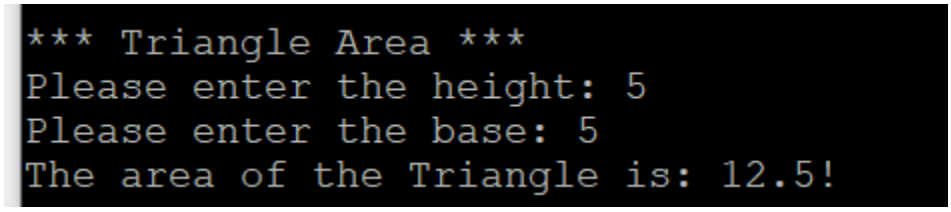
Preconditions: Rhombus Area Calculation (see Test Case #010)

Inputs: 5

Expected Output: 12.5

Expected Postconditions: N/A

Execution History: Passed (9/25/24)



Maximum Value -1 Testing

Test Case #012

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rectangle with sides of value 46340

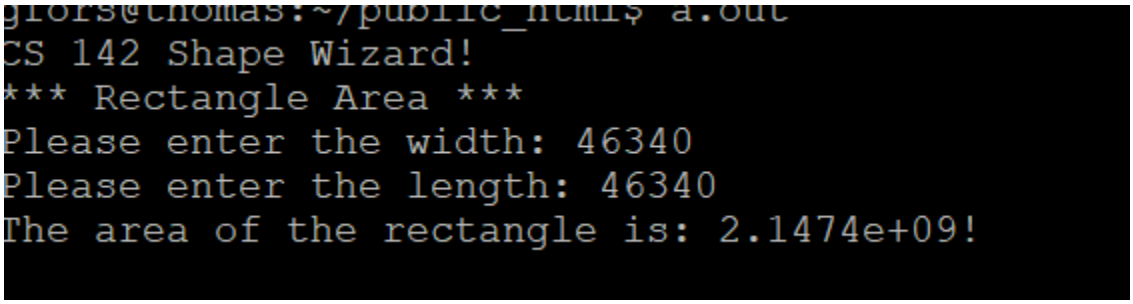
Preconditions: N/A

Inputs: 46340

Expected Output: 2147395600

Expected Postconditions: Square Area Calculation (see Test Case #013)

Execution History: Passed (9/25/24)



Test Case #013

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Square with sides of value 46340

Preconditions: Rectangle Area Calculation (see Test Case #012)

Inputs: 46340

Expected Output: 2147395600

Expected Postconditions: Rhombus Area Calculation (see Test Case #014)

Execution History: Passed (9/25/24)

```
*** Square Area ***
Please enter the width: 46340
Please enter the length: 46340
The area of the square is: 2.1474e+09!

*** Rhombus Area ***
```

Test Case #014

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value 46340

Preconditions: Square Area Calculation (see Test Case #013)

Inputs: 46340

Expected Output: 1073687800

Expected Postconditions: Triangle Area Calculation (see Test Case #015)

Execution History: Passed (9/25/24)

```
*** Rhombus Area ***
Please enter the diagonal: 46340
Please enter the diagonal: 46340
The area of the Rhombus is: 1.0737e+09!
```

Test Case #015

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value 46340

Preconditions: Rhombus Area Calculation (see Test Case #014)

Inputs: 46340

Expected Output: 1073687800

Expected Postconditions: N/A

Execution History: Passed (9/25/24)

```
*** Triangle Area ***
Please enter the height: 46340
Please enter the base: 46340
The area of the Triangle is: 1.0737e+09!
```

Maximum Value Testing

Test Case #016

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rectangle with sides of value 46341

Preconditions: N/A

Inputs: 46341

Expected Output: 2147488281

Expected Postconditions: Square Area Calculation (see Test Case #017)

Execution History: Failed (9/25/24)

```
CS 142 Shape Wizard!
*** Rectangle Area ***
Please enter the width: 46341
Please enter the length: 46341
The area of the rectangle is: -2.14748e+09!
```

Test Case #017

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Square with sides of value 46341

Preconditions: Rectangle Area Calculation (see Test Case #016)

Inputs: 46341

Expected Output: 2147488281

Expected Postconditions: Rhombus Area Calculation (see Test Case #018)

Execution History: Failed (9/25/24)

```
*** Square Area ***
Please enter the width: 46341
Please enter the length: 46341
The area of the square is: -2.14748e+09!
```

Test Case #018

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value 46341

Preconditions: Square Area Calculation (see Test Case #017)

Inputs: 46341

Expected Output: 1073744140.5

Expected Postconditions: Triangle Area Calculation (see Test Case #019)

Execution History: Failed (9/25/24)

```
*** Rhombus Area ***
Please enter the diagonal: 46341
Please enter the diagonal: 46341
The area of the Rhombus is: -1.07374e+09!
```

Test Case #019

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value 46341

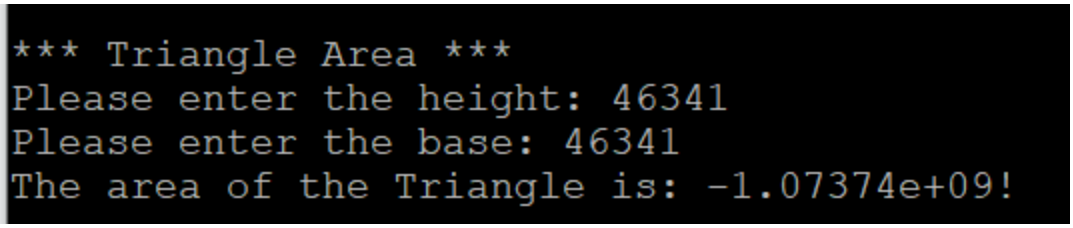
Preconditions: Rhombus Area Calculation (see Test Case #018)

Inputs: 46341

Expected Output: 1073744140.5

Expected Postconditions: N/A

Execution History: Failed (9/25/24)



Robust Boundary Value Testing

Minimum Value -1 Testing

Test Case #020

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rectangle with sides of value -1

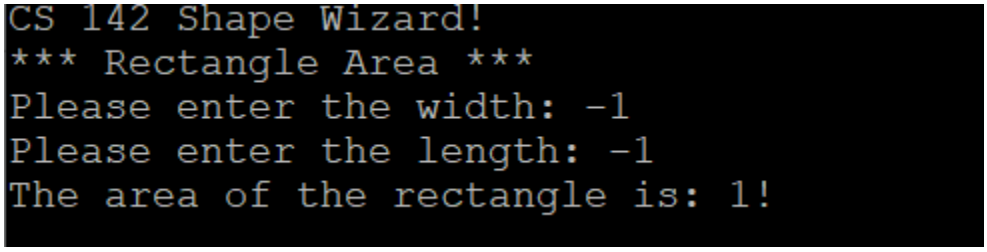
Preconditions: N/A

Inputs: -1

Expected Output: 0

Expected Postconditions: Square Area Calculation (see Test Case #021)

Execution History: Failed (9/25/24)



Test Case #021

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Square with sides of value -1

Preconditions: Rectangle Area Calculation (see Test Case #020)

Inputs: -1

Expected Output: 0

Expected Postconditions: Rhombus Area Calculation (see Test Case #022)

Execution History: Failed (9/25/24)

```
*** Square Area ***
Please enter the width: -1
Please enter the length: -1
The area of the square is: 1!
```

Test Case #022

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value -1

Preconditions: Square Area Calculation (see Test Case #021)

Inputs: -1

Expected Output: 0

Expected Postconditions: Triangle Area Calculation (see Test Case #013)

Execution History: Failed (9/25/24)

```
*** Rhombus Area ***
Please enter the diagonal: -1
Please enter the diagonal: -1
The area of the Rhombus is: 0.5!
```

Test Case #023

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value -1

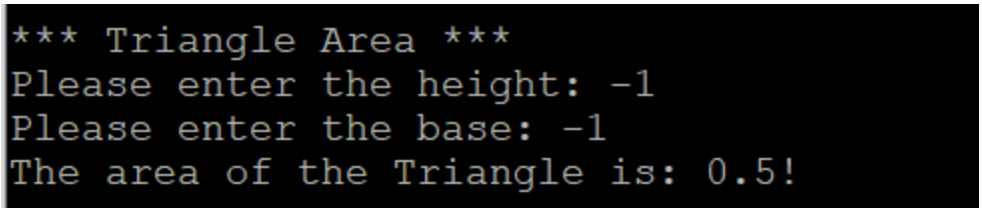
Preconditions: Rhombus Area Calculation (see Test Case #022)

Inputs: -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: Failed (9/25/24)



Minimum Value Testing

Refer to test cases #000 - #003

Minimum Value +1 Testing

Refer to test cases #004 - #007

Nominal Value Testing

Refer to test cases #008 - #011

Maximum Value -1 Testing

Refer to test cases #012 - #015

Maximum Value Testing

Refer to test cases #016 - #019

Maximum Value +1 Testing

Test Case #024

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rectangle with sides of value 46342

Preconditions: N/A

Inputs: 46342

Expected Output: 2147580964

Expected Postconditions: Square Area Calculation (see Test Case #024)

Execution History: Failed (9/25/24)

```
CS 142 Shape Wizard!
*** Rectangle Area ***
Please enter the width: 46342
Please enter the length: 46342
The area of the rectangle is: -2.14739e+09!
```

Test Case #025

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Square with sides of value 46342

Preconditions: Rectangle Area Calculation (see Test Case #024)

Inputs: 46342

Expected Output: 2147580964

Expected Postconditions: Rhombus Area Calculation (see Test Case #026)

Execution History: Failed (9/25/24)

```
*** Square Area ***
Please enter the width: 46342
Please enter the length: 46342
The area of the square is: -2.14739e+09!
```

Test Case #026

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Rhombus with sides of value 46342

Preconditions: Square Area Calculation (see Test Case #025)

Inputs: 46342

Expected Output: 1073790482

Expected Postconditions: Triangle Area Calculation (see Test Case #027)

Execution History: Failed (9/25/24)

```
*** Rhombus Area ***
Please enter the diagonal: 46342
Please enter the diagonal: 46342
The area of the Rhombus is: -1.07369e+09!
```

Test Case #027

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a Triangle with sides of value 46342

Preconditions: Rhombus Area Calculation (see Test Case #026)

Inputs: 46342

Expected Output: 1073790482

Expected Postconditions: N/A

Execution History: Failed (9/25/24)

```
*** Triangle Area ***
Please enter the height: 46342
Please enter the base: 46342
The area of the Triangle is: -1.07369e+09!
```

Worst-case Boundary Value Testing

Minimum X and minimum Y

Test Case #108

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, 0

Preconditions: N/A

Inputs: 0, 0

Expected Output: 0

Expected Postconditions: square area calculation (see Test Case #109)

Execution History: passed (9/25/24)

Test Case #109

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides 0, 0

Preconditions: test case 108

Inputs: 0, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #110)

Execution History: passed (9/25/24)

Test Case #110

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, 0

Preconditions: test case 109

Inputs: 0, 0

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #111)

Execution History: passed (9/25/24)

Test Case #111

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, 0

Preconditions: test case 110

Inputs: 0, 0

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum X and minimum + 1 Y

Test Case #112

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, 1

Preconditions: N/A

Inputs: 0, 1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #113)

Execution History: passed (9/25/24)

Test Case #113

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, 1

Preconditions: test case 112

Inputs: 0, 1

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #114)

Execution History: passed (9/25/24)

Test Case #114

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, 1

Preconditions: test case 113

Inputs: 0, 1

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum X and nominal Y

Test Case #115

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, 5

Preconditions: N/A

Inputs: 0, 5

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #116)

Execution History: passed (9/25/24)

Test Case #116

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, 5

Preconditions: test case 115

Inputs: 0, 5

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #117)

Execution History: passed (9/25/24)

Test Case #117

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, 5

Preconditions: test case 116

Inputs: 0, 5

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum X and maximum -1 Y

Test Case #118

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, 46340

Preconditions: N/A

Inputs: 0, 46340

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #119)

Execution History: passed (9/25/24)

Test Case #119

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, 46340

Preconditions: test case 118

Inputs: 0, 46340

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #120)

Execution History: passed (9/25/24)

Test Case #120

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, 46340

Preconditions: test case 119

Inputs: 0, 46340

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum X and maximum Y

Test Case #121

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, 46341

Preconditions: N/A

Inputs: 0, 46341

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #122)

Execution History: passed (9/25/24)

Test Case #122

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, 46341

Preconditions: test case 121

Inputs: 0, 46341

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #123)

Execution History: passed (9/25/24)

Test Case #123

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, 46341

Preconditions: test case 122

Inputs: 0, 46341

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum + 1 X and minimum Y

Test Case #124

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1, 0

Preconditions: N/A

Inputs: 1, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #125)

Execution History: passed (9/25/24)

Test Case #125

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1, 0

Preconditions: test case 124

Inputs: 1, 0

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #126)

Execution History: passed (9/25/24)

Test Case #126

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, 0

Preconditions: test case 125

Inputs: 1, 0

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum + 1 X and minimum + 1 Y

Test Case #127

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1, 1

Preconditions: N/A

Inputs: 1, 1

Expected Output: 1

Expected Postconditions: square area calculation (see Test Case #128)

Execution History: passed (9/25/24)

Test Case #128

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides 1, 1

Preconditions: test case 127

Inputs: 1, 1

Expected Output: 1

Expected Postconditions: rhombus area calculation (see Test Case #129)

Execution History: passed (9/25/24)

Test Case #129

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1, 1

Preconditions: test case 128

Inputs: 1, 1

Expected Output: 0.5

Expected Postconditions: triangle area calculation (see Test Case #130)

Execution History: passed (9/25/24)

Test Case #130

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, 1

Preconditions: test case 129

Inputs: 1, 1

Expected Output: 0.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum + 1 X and nominal Y

Test Case #131

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1, 5

Preconditions: N/A

Inputs: 1, 5

Expected Output: 5

Expected Postconditions: rhombus area calculation (see Test Case #132)

Execution History: passed (9/25/24)

Test Case #132

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1, 5

Preconditions: test case 131

Inputs: 1, 5

Expected Output: 2.5

Expected Postconditions: triangle area calculation (see Test Case #133)

Execution History: passed (9/25/24)

Test Case #133

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, 5

Preconditions: test case 132

Inputs: 1, 5

Expected Output: 2.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum + 1 X and maximum -1 Y

Test Case #134

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1, 46340

Preconditions: N/A

Inputs: 1, 46340

Expected Output: 46340

Expected Postconditions: rhombus area calculation (see Test Case #135)

Execution History: passed (9/25/24)

Test Case #135

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1, 46340

Preconditions: test case 134

Inputs: 1, 46340

Expected Output: 23170.0

Expected Postconditions: triangle area calculation (see Test Case #136)

Execution History: passed (9/25/24)

Test Case #136

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, 46340

Preconditions: test case 135

Inputs: 1, 46340

Expected Output: 23170.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum + 1 X and maximum Y

Test Case #137

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1, 46341

Preconditions: N/A

Inputs: 1, 46341

Expected Output: 46341

Expected Postconditions: rhombus area calculation (see Test Case #138)

Execution History: passed (9/25/24)

Test Case #138

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1, 46341

Preconditions: test case 137

Inputs: 1, 46341

Expected Output: 23170.5

Expected Postconditions: triangle area calculation (see Test Case #139)

Execution History: passed (9/25/24)

Test Case #139

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, 46341

Preconditions: test case 138

Inputs: 1, 46341

Expected Output: 23170.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Nominal X and minimum Y

Test Case #140

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, 0

Preconditions: N/A

Inputs: 5, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #141)

Execution History: passed (9/25/24)

Test Case #141

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, 0

Preconditions: test case 140

Inputs: 5, 0

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #142)

Execution History: passed (9/25/24)

Test Case #142

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, 0

Preconditions: test case 141

Inputs: 5, 0

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Nominal X and minimum + 1 Y

Test Case #143

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, 1

Preconditions: N/A

Inputs: 5, 1

Expected Output: 5

Expected Postconditions: rhombus area calculation (see Test Case #144)

Execution History: passed (9/25/24)

Test Case #144

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, 1

Preconditions: test case 143

Inputs: 5, 1

Expected Output: 2.5

Expected Postconditions: triangle area calculation (see Test Case #145)

Execution History: passed (9/25/24)

Test Case #145

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, 1

Preconditions: test case 144

Inputs: 5, 1

Expected Output: 2.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

```
****Rhombus Area****
Please enter the side of one diagonal: 5
Please enter the side of the other diagonal: 1
The area of the rhombus is: 2.5
```

Nominal X and nominal Y

Test Case #146

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, 5

Preconditions: N/A

Inputs: 5, 5

Expected Output: 25

Expected Postconditions: square area calculation (see Test Case #147)

Execution History: passed (9/25/24)

Test Case #147

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides 5, 5

Preconditions: test case 146

Inputs: 5, 5

Expected Output: 25

Expected Postconditions: rhombus area calculation (see Test Case #148)

Execution History: passed (9/25/24)

Test Case #148

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, 5

Preconditions: test case 147

Inputs: 5, 5

Expected Output: 12.5

Expected Postconditions: triangle area calculation (see Test Case #149)

Execution History: passed (9/25/24)

Test Case #149

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, 5

Preconditions: test case 148

Inputs: 5, 5

Expected Output: 12.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Nominal X and maximum -1 Y

Test Case #150

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, 46340

Preconditions: N/A

Inputs: 5, 46340

Expected Output: 231700

Expected Postconditions: rhombus area calculation (see Test Case #151)

Execution History: passed (9/25/24)

Test Case #151

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, 46340

Preconditions: test case 150

Inputs: 5, 46340

Expected Output: 115850.0

Expected Postconditions: triangle area calculation (see Test Case #152)

Execution History: passed (9/25/24)

Test Case #152

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, 46340

Preconditions: test case 151

Inputs: 5, 46340

Expected Output: 115850.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Nominal X and maximum Y

Test Case #153

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, 46341

Preconditions: N/A

Inputs: 5, 46341

Expected Output: 231705

Expected Postconditions: rhombus area calculation (see Test Case #154)

Execution History: passed (9/25/24)

Test Case #154

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, 46341

Preconditions: test case 153

Inputs: 5, 46341

Expected Output: 115852.5

Expected Postconditions: triangle area calculation (see Test Case #155)

Execution History: passed (9/25/24)

Test Case #155

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, 46341

Preconditions: test case 154

Inputs: 5, 46341

Expected Output: 115852.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum -1 X and minimum Y

Test Case #156

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, 0

Preconditions: N/A

Inputs: 46340, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #157)

Execution History: passed (9/25/24)

Test Case #157

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, 0

Preconditions: test case 156

Inputs: 46340, 0

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #158)

Execution History: passed (9/25/24)

Test Case #158

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, 0

Preconditions: test case 157

Inputs: 46340, 0

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum -1 X and minimum + 1 Y

Test Case #159

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, 1

Preconditions: N/A

Inputs: 46340, 1

Expected Output: 46340

Expected Postconditions: rhombus area calculation (see Test Case #160)

Execution History: passed (9/25/24)

Test Case #160

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, 1

Preconditions: test case 159

Inputs: 46340, 1

Expected Output: 23170.0

Expected Postconditions: triangle area calculation (see Test Case #161)

Execution History: passed (9/25/24)

Test Case #161

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, 1

Preconditions: test case 160

Inputs: 46340, 1

Expected Output: 23170.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum -1 X and nominal Y

Test Case #162

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, 5

Preconditions: N/A

Inputs: 46340, 5

Expected Output: 231700

Expected Postconditions: rhombus area calculation (see Test Case #163)

Execution History: passed (9/25/24)

Test Case #163

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, 5

Preconditions: test case 162

Inputs: 46340, 5

Expected Output: 115850.0

Expected Postconditions: triangle area calculation (see Test Case #164)

Execution History: passed (9/25/24)

Test Case #164

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, 5

Preconditions: test case 163

Inputs: 46340, 5

Expected Output: 115850.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum -1 X and maximum -1 Y

Test Case #165

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, 46340

Preconditions: N/A

Inputs: 46340, 46340

Expected Output: 2147395600

Expected Postconditions: square area calculation (see Test Case #166)

Execution History: failed (9/25/24)

Test Case #166

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides 46340, 46340

Preconditions: test case 165

Inputs: 46340, 46340

Expected Output: 2147395600

Expected Postconditions: rhombus area calculation (see Test Case #167)

Execution History: failed (9/25/24)

Test Case #167

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, 46340

Preconditions: test case 166

Inputs: 46340, 46340

Expected Output: 1.0736978E9

Expected Postconditions: triangle area calculation (see Test Case #168)

Execution History: failed (9/25/24)

Test Case #168

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, 46340

Preconditions: test case 167

Inputs: 46340, 46340

Expected Output: 1.0736978E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum -1 X and maximum Y

Test Case #169

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, 46341

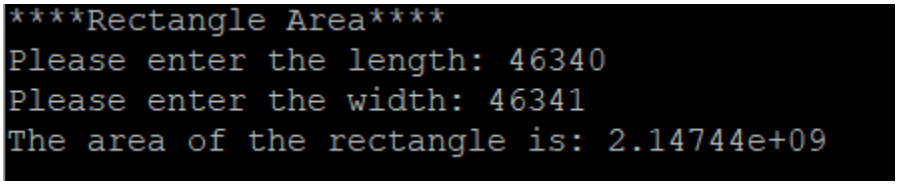
Preconditions: N/A

Inputs: 46340, 46341

Expected Output: 2147441940

Expected Postconditions: rhombus area calculation (see Test Case #170)

Execution History: failed (9/25/24)



Test Case #170

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, 46341

Preconditions: test case 169

Inputs: 46340, 46341

Expected Output: 1.07372097E9

Expected Postconditions: triangle area calculation (see Test Case #171)

Execution History: failed (9/25/24)

Test Case #171

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, 46341

Preconditions: test case 170

Inputs: 46340, 46341

Expected Output: 1.07372097E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum X and minimum Y

Test Case #172

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, 0

Preconditions: N/A

Inputs: 46341, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #173)

Execution History: passed (9/25/24)

Test Case #173

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, 0

Preconditions: test case 172

Inputs: 46341, 0

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #174)

Execution History: passed (9/25/24)

Test Case #174

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, 0

Preconditions: test case 173

Inputs: 46341, 0

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum X and minimum + 1 Y

Test Case #175

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, 1

Preconditions: N/A

Inputs: 46341, 1

Expected Output: 46341

Expected Postconditions: rhombus area calculation (see Test Case #176)

Execution History: passed (9/25/24)

Test Case #176

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, 1

Preconditions: test case 175

Inputs: 46341, 1

Expected Output: 23170.5

Expected Postconditions: triangle area calculation (see Test Case #177)

Execution History: passed (9/25/24)

Test Case #177

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, 1

Preconditions: test case 176

Inputs: 46341, 1

Expected Output: 23170.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum X and nominal Y

Test Case #178

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, 5

Preconditions: N/A

Inputs: 46341, 5

Expected Output: 231705

Expected Postconditions: rhombus area calculation (see Test Case #179)

Execution History: passed (9/25/24)

Test Case #179

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, 5

Preconditions: test case 178

Inputs: 46341, 5

Expected Output: 115852.5

Expected Postconditions: triangle area calculation (see Test Case #180)

Execution History: passed (9/25/24)

Test Case #180

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, 5

Preconditions: test case 179

Inputs: 46341, 5

Expected Output: 115852.5

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum X and maximum -1 Y

Test Case #181

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, 46340

Preconditions: N/A

Inputs: 46341, 46340

Expected Output: 2147441940

Expected Postconditions: rhombus area calculation (see Test Case #182)

Execution History: failed (9/25/24)

Test Case #182

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, 46340

Preconditions: test case 181

Inputs: 46341, 46340

Expected Output: 1.07372097E9

Expected Postconditions: triangle area calculation (see Test Case #183)

Execution History: failed (9/25/24)

Test Case #183

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, 46340

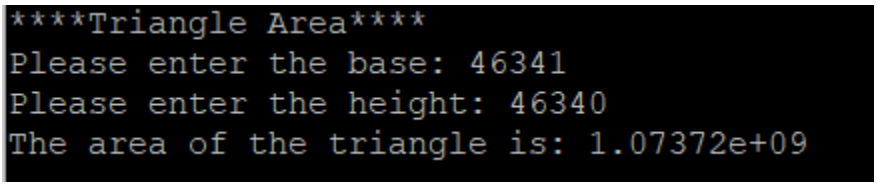
Preconditions: test case 182

Inputs: 46341, 46340

Expected Output: 1.07372097E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)



Maximum X and maximum Y

Test Case #184

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, 46341

Preconditions: N/A

Inputs: 46341, 46341

Expected Output: 2147479015

Expected Postconditions: square area calculation (see Test Case #185)

Execution History: failed (9/25/24)

Test Case #185

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides 46341, 46341

Preconditions: test case 184

Inputs: 46341, 46341

Expected Output: 2147479015

Expected Postconditions: rhombus area calculation (see Test Case #186)

Execution History: failed (9/25/24)

Test Case #186

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, 46341

Preconditions: test case 185

Inputs: 46341, 46341

Expected Output: 1.0737395075E9

Expected Postconditions: triangle area calculation (see Test Case #187)

Execution History: failed (9/25/24)

Test Case #187

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, 46341

Preconditions: test case 186

Inputs: 46341, 46341

Expected Output: 1.0737395075E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Robust Worst-case Boundary Value Testing

Minimum -1 X and minimum -1 Y

Test Case #108

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, -1

Preconditions: N/A

Inputs: -1, -1

Expected Output: 0

Expected Postconditions: square area calculation (see Test Case #109)

Execution History: failed (9/25/24)

Test Case #109

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides -1, -1

Preconditions: test case 108

Inputs: -1, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #110)

Execution History: failed (9/25/24)

Test Case #110

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, -1

Preconditions: test case 109

Inputs: -1, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #111)

Execution History: failed (9/25/24)

Test Case #111

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, -1

Preconditions: test case 110

Inputs: -1, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum -1 X and minimum Y

Test Case #112

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, 0

Preconditions: N/A

Inputs: -1, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #113)

Execution History: failed (9/25/24)

Test Case #113

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, 0

Preconditions: test case 112

Inputs: -1, 0

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #114)

Execution History: failed (9/25/24)

Test Case #114

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, 0

Preconditions: test case 113

Inputs: -1, 0

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum -1 X and minimum + 1 Y

Test Case #115

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, 1

Preconditions: N/A

Inputs: -1, 1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #116)

Execution History: failed (9/25/24)

Test Case #116

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, 1

Preconditions: test case 115

Inputs: -1, 1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #117)

Execution History: failed (9/25/24)

Test Case #117

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, 1

Preconditions: test case 116

Inputs: -1, 1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum -1 X and nominal Y

Test Case #118

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, 5

Preconditions: N/A

Inputs: -1, 5

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #119)

Execution History: failed (9/25/24)

Test Case #119

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, 5

Preconditions: test case 118

Inputs: -1, 5

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #120)

Execution History: failed (9/25/24)

Test Case #120

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, 5

Preconditions: test case 119

Inputs: -1, 5

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum -1 X and maximum -1 Y

Test Case #121

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, 46340

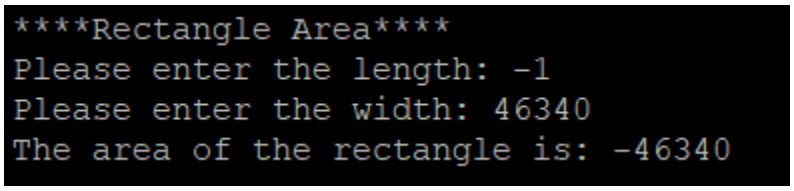
Preconditions: N/A

Inputs: -1, 46340

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #122)

Execution History: failed (9/25/24)



Test Case #122

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, 46340

Preconditions: test case 121

Inputs: -1, 46340

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #123)

Execution History: failed (9/25/24)

Test Case #123

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, 46340

Preconditions: test case 122

Inputs: -1, 46340

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum -1 X and maximum Y

Test Case #124

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, 46341

Preconditions: N/A

Inputs: -1, 46341

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #125)

Execution History: failed (9/25/24)

Test Case #125

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, 46341

Preconditions: test case 124

Inputs: -1, 46341

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #126)

Execution History: failed (9/25/24)

Test Case #126

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, 46341

Preconditions: test case 125

Inputs: -1, 46341

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum -1 X and maximum +1 Y

Test Case #127

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides -1, 46342

Preconditions: N/A

Inputs: -1, 46342

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #128)

Execution History: failed (9/25/24)

Test Case #128

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides -1, 46342

Preconditions: test case 127

Inputs: -1, 46342

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #129)

Execution History: failed (9/25/24)

Test Case #129

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides -1, 46342

Preconditions: test case 128

Inputs: -1, 46342

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum X and minimum -1 Y

Test Case #130

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, -1

Preconditions: N/A

Inputs: 0, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #131)

Execution History: failed (9/25/24)

Test Case #131

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, -1

Preconditions: test case 130

Inputs: 0, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #132)

Execution History: failed (9/25/24)

Test Case #132

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, -1

Preconditions: test case 131

Inputs: 0, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum X and minimum Y

Refer to test cases#132-135

Minimum X and minimum + 1 Y

Refer to test cases#131-134

Minimum X and nominal Y

Refer to test cases#130-133

Minimum X and maximum -1 Y

Refer to test cases#129-132

Minimum X and maximum Y

Refer to test cases#128-131

Minimum X and maximum +1 Y

Test Case #133

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 0, 46342

Preconditions: N/A

Inputs: 0, 46342

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #134)

Execution History: passed (9/25/24)

Test Case #134

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 0, 46342

Preconditions: test case 133

Inputs: 0, 46342

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #135)

Execution History: passed (9/25/24)

Test Case #135

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 0, 46342

Preconditions: test case 134

Inputs: 0, 46342

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Minimum + 1 X and minimum -1 Y

Test Case #136

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1, -1

Preconditions: N/A

Inputs: 1, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #137)

Execution History: failed (9/25/24)

Test Case #137

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1, -1

Preconditions: test case 136

Inputs: 1, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #138)

Execution History: failed (9/25/24)

Test Case #138

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, -1

Preconditions: test case 137

Inputs: 1, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Minimum + 1 X and minimum Y

Refer to test cases#137-140

Minimum + 1 X and minimum + 1 Y

Refer to test cases#135-138

Minimum + 1 X and nominal Y

Refer to test cases#133-136

Minimum + 1 X and maximum -1 Y

Refer to test cases#131-134

Minimum + 1 X and maximum Y

Refer to test cases#129-132

Minimum + 1 X and maximum +1 Y

Test Case #139

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 1,

46342

Preconditions: N/A

Inputs: 1, 46342

Expected Output: 46342

Expected Postconditions: rhombus area calculation (see Test Case #140)

Execution History: passed (9/25/24)

Test Case #140

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 1,

46342

Preconditions: test case 139

Inputs: 1, 46342

Expected Output: 23171.0

Expected Postconditions: triangle area calculation (see Test Case #141)

Execution History: passed (9/25/24)

Test Case #141

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 1, 46342

Preconditions: test case 140

Inputs: 1, 46342

Expected Output: 23171.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Nominal X and minimum -1 Y

Test Case #142

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, -1

Preconditions: N/A

Inputs: 5, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #143)

Execution History: failed (9/25/24)

Test Case #143

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, -1

Preconditions: test case 142

Inputs: 5, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #144)

Execution History: failed (9/25/24)

Test Case #144

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, -1

Preconditions: test case 143

Inputs: 5, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Nominal X and minimum Y

Refer to test cases#142-145

Nominal X and minimum + 1 Y

Refer to test cases#139-142

Nominal X and nominal Y

Refer to test cases#136-139

Nominal X and maximum -1 Y

Refer to test cases#133-136

Nominal X and maximum Y

Refer to test cases#130-133

Nominal X and maximum +1 Y

Test Case #145

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 5, 46342

Preconditions: N/A

Inputs: 5, 46342

Expected Output: 231710

Expected Postconditions: rhombus area calculation (see Test Case #146)

Execution History: passed (9/25/24)

Test Case #146

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 5, 46342

Preconditions: test case 145

Inputs: 5, 46342

Expected Output: 115855.0

Expected Postconditions: triangle area calculation (see Test Case #147)

Execution History: passed (9/25/24)

Test Case #147

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 5, 46342

Preconditions: test case 146

Inputs: 5, 46342

Expected Output: 115855.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum -1 X and minimum -1 Y

Test Case #148

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, -1

Preconditions: N/A

Inputs: 46340, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #149)

Execution History: failed (9/25/24)

Test Case #149

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, -1

Preconditions: test case 148

Inputs: 46340, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #150)

Execution History: failed (9/25/24)

Test Case #150

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, -1

Preconditions: test case 149

Inputs: 46340, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum -1 X and minimum Y

Refer to test cases#147-150

Maximum -1 X and minimum + 1 Y

Refer to test cases#143-146

Maximum -1 X and nominal Y

Refer to test cases#139-142

Maximum -1 X and maximum -1 Y

Refer to test cases#135-138

Maximum -1 X and maximum Y

Refer to test cases#131-134

Maximum -1 X and maximum +1 Y

Test Case #151

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46340, 46342

Preconditions: N/A

Inputs: 46340, 46342

Expected Output: 2147479016

Expected Postconditions: rhombus area calculation (see Test Case #152)

Execution History: failed (9/25/24)

Test Case #152

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46340, 46342

Preconditions: test case 151

Inputs: 46340, 46342

Expected Output: 1.073739508E9

Expected Postconditions: triangle area calculation (see Test Case #153)

Execution History: failed (9/25/24)

Test Case #153

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46340, 46342

Preconditions: test case 152

Inputs: 46340, 46342

Expected Output: 1.073739508E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum X and minimum -1 Y

Test Case #154

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, -1

Preconditions: N/A

Inputs: 46341, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #155)

Execution History: failed (9/25/24)

Test Case #155

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, -1

Preconditions: test case 154

Inputs: 46341, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #156)

Execution History: failed (9/25/24)

Test Case #156

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, -1

Preconditions: test case 155

Inputs: 46341, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum X and minimum Y

Refer to test cases#152-155

Maximum X and minimum + 1 Y

Refer to test cases#147-150

Maximum X and nominal Y

Refer to test cases#142-145

Maximum X and maximum -1 Y

Refer to test cases#137-140

Maximum X and maximum Y

Refer to test cases#132-135

Maximum X and maximum +1 Y

Test Case #157

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46341, 46342

Preconditions: N/A

Inputs: 46341, 46342

Expected Output: 2147432674

Expected Postconditions: rhombus area calculation (see Test Case #158)

Execution History: failed (9/25/24)

Test Case #158

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46341, 46342

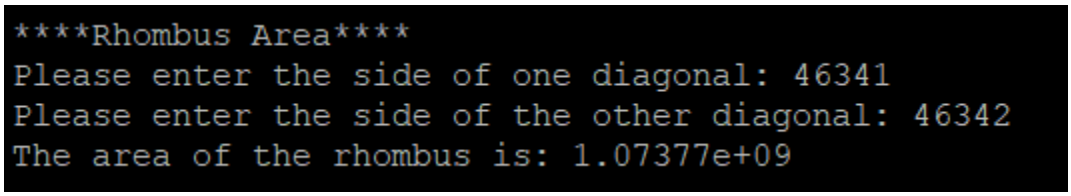
Preconditions: test case 157

Inputs: 46341, 46342

Expected Output: 1.073716337E9

Expected Postconditions: triangle area calculation (see Test Case #159)

Execution History: failed (9/25/24)



Test Case #159

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46341, 46342

Preconditions: test case 158

Inputs: 46341, 46342

Expected Output: 1.073716337E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum +1 X and minimum -1 Y

Test Case #160

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342, -1

Preconditions: N/A

Inputs: 46342, -1

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #161)

Execution History: failed (9/25/24)

Test Case #161

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342, -1

Preconditions: test case 160

Inputs: 46342, -1

Expected Output: 0

Expected Postconditions: triangle area calculation (see Test Case #162)

Execution History: failed (9/25/24)

Test Case #162

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, -1

Preconditions: test case 161

Inputs: 46342, -1

Expected Output: 0

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum +1 X and minimum Y

Test Case #163

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342, 0

Preconditions: N/A

Inputs: 46342, 0

Expected Output: 0

Expected Postconditions: rhombus area calculation (see Test Case #164)

Execution History: passed (9/25/24)

Test Case #164

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342, 0

Preconditions: test case 163

Inputs: 46342, 0

Expected Output: 0.0

Expected Postconditions: triangle area calculation (see Test Case #165)

Execution History: passed (9/25/24)

Test Case #165

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, 0

Preconditions: test case 164

Inputs: 46342, 0

Expected Output: 0.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum +1 X and minimum + 1 Y

Test Case #166

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342, 1

Preconditions: N/A

Inputs: 46342, 1

Expected Output: 46342

Expected Postconditions: rhombus area calculation (see Test Case #167)

Execution History: passed (9/25/24)

Test Case #167

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342,

1

Preconditions: test case 166

Inputs: 46342, 1

Expected Output: 23171.0

Expected Postconditions: triangle area calculation (see Test Case #168)

Execution History: passed (9/25/24)

```
****Rhombus Area****
Please enter the side of one diagonal: 46342
Please enter the side of the other diagonal: 1
The area of the rhombus is: 23171
```

Test Case #168

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, 1

Preconditions: test case 167

Inputs: 46342, 1

Expected Output: 23171.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum +1 X and nominal Y

Test Case #169

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342,

5

Preconditions: N/A

Inputs: 46342, 5

Expected Output: 231710

Expected Postconditions: rhombus area calculation (see Test Case #170)

Execution History: passed (9/25/24)

Test Case #170

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342,

5

Preconditions: test case 169

Inputs: 46342, 5

Expected Output: 115855.0

Expected Postconditions: triangle area calculation (see Test Case #171)

Execution History: passed (9/25/24)

Test Case #171

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, 5

Preconditions: test case 170

Inputs: 46342, 5

Expected Output: 115855.0

Expected Postconditions: N/A

Execution History: passed (9/25/24)

Maximum +1 X and maximum -1 Y

Test Case #172

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342, 46340

Preconditions: N/A

Inputs: 46342, 46340

Expected Output: 2147479016

Expected Postconditions: rhombus area calculation (see Test Case #173)

Execution History: failed (9/25/24)

Test Case #173

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342, 46340

Preconditions: test case 172

Inputs: 46342, 46340

Expected Output: 1.073739508E9

Expected Postconditions: triangle area calculation (see Test Case #174)

Execution History: failed (9/25/24)

Test Case #174

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, 46340

Preconditions: test case 173

Inputs: 46342, 46340

Expected Output: 1.073739508E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum +1 X and maximum Y

Test Case #175

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342, 46341

Preconditions: N/A

Inputs: 46342, 46341

Expected Output: 2147432674

Expected Postconditions: rhombus area calculation (see Test Case #176)

Execution History: failed (9/25/24)

Test Case #176

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342, 46341

Preconditions: test case 175

Inputs: 46342, 46341

Expected Output: 1.073716337E9

Expected Postconditions: triangle area calculation (see Test Case #177)

Execution History: failed (9/25/24)

Test Case #177

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, 46341

Preconditions: test case 176

Inputs: 46342, 46341

Expected Output: 1.073716337E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Maximum +1 X and maximum +1 Y

Test Case #178

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rectangle with sides 46342, 46342

Preconditions: N/A

Inputs: 46342, 46342

Expected Output: 2147386332

Expected Postconditions: square area calculation (see Test Case #179)

Execution History: failed (9/25/24)

Test Case #179

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a square with sides 46342, 46342

Preconditions: test case 178

Inputs: 46342, 46342

Expected Output: 2147386332

Expected Postconditions: rhombus area calculation (see Test Case #180)

Execution History: failed (9/25/24)

Test Case #180

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a rhombus with sides 46342, 46342

Preconditions: test case 179

Inputs: 46342, 46342

Expected Output: 1.073693166E9

Expected Postconditions: triangle area calculation (see Test Case #181)

Execution History: failed (9/25/24)

Test Case #181

Purpose: The purpose of this test is to demonstrate that the program correctly calculates the area of a triangle with sides 46342, 46342

Preconditions: test case 180

Inputs: 46342, 46342

Expected Output: 1.073693166E9

Expected Postconditions: N/A

Execution History: failed (9/25/24)

Recap

Sean

I was in charge of the Robust Worst Case Boundary Value Analysis. In order to complete the Robust Worst Case BVA I created 7 test cases for each variable which came out to 49 tests for each shape except for the square because there is only one input variable for a square. I chose the 7 test cases by picking one under the minimum value, the minimum value, one above the minimum value, a nominal value, one under the maximum value, the maximum value, and one above the maximum value. Since the minimum - maximum values were used in the normal Worst Case Boundary Value Analysis I just needed to test when either of the variables (called X and Y in the report) was one under the minimum value or one over the maximum value. Whenever one variable was one under the minimum value the program would fail because it would return a negative area, when one of the variables was one above the maximum value it would occasionally work depending on how large the product was supposed to be.

Since there were so many variables to test and report I created a program to automatically write up each test scenario. In order to automatically write the test reports I created a few arrays of strings with the various different sentences such as “Maximum X and minimum - 1 Y” and a few arrays of ints for the various numbers such as the test case number. I then created a system of nested loops to loop through the 7 different test cases for each variable and match them up with every test case for the other variable so no test cases would get left out, for each test case it would loop through each individual shape because the different shapes have different expected outputs.

Aman

I worked on the worst case BVT and went over the test cases we talked about in class. Here what I did, was that I looked at the max, min, nominal and boundary values while rejecting the single fault assumption to see the impact that variables have on each other when they are modified at the same time.

Worst case scenario boundary testing is useful as it allows us to see whether or not the variables can impact each other. The way we went across executing this part of the testing was by creating a program (shoutout sean for massive help) and configured it to look at the max/min/nominal values and reject single fault assumptions in hope of checking to see if there's any errors

Gavin

I was in charge of Boundary Value Testing and Robust Boundary Value Testing Analysis. In order to complete the Boundary Value Testing I created test cases using the variables in tandem (as they interact with each other through multiplication in the program) for the min value, min +1, nominal, max-1, and max values. For Robust Boundary Value Testing, I could reuse the tests from Boundary Value Testing and add min-1 and max+1. Because there aren't as many test cases as the later two, I was able to manually complete every test case.

I used 46341 as the maximum value as it is the root of the largest integer held in C++. I used 0 as the minimum value as a shape wouldn't have a negative side, although a shape could be non-existent, in which case the side would be 0.