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**Assignment Description:** The objective of this assignment is for you to (a) develop a set of tests for an existing triangle classification program, (b) use those tests to find and fix defects in that program, and (c) report on your testing results for the Triangle problem

**Honor Pledge:** *I pledge our Honor that I have abided by the Stevens Honor System.*

**Summary:**

Part 1 (Testing the Original Triangle.py):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test ID** | **Input** | **Expected Results** | **Actual Result** | **Pass or Fail** |
| **1** | **3,4,5** | **Right** | **InvalidInput** | **Fail** |
| **2** | **5,3,4** | **Right** | **InvalidInput** | **Fail** |
| **3** | **4,5,3** | **Right** | **InvalidInput** | **Fail** |
| **4** | **1,1,1** | **Equilateral** | **InvalidInput** | **Fail** |
| **5** | **4,2,3** | **Scalene** | **InvalidInput** | **Fail** |
| **6** | **2,2,3** | **Isoceles** | **InvalidInput** | **Fail** |
| **7** | **2,3,2** | **Isoceles** | **InvalidInput** | **Fail** |
| **8** | **3,2,2** | **Isoceles** | **InvalidInput** | **Fail** |
| **9** | **200,199,200** | **Isoceles** | **InvalidInput** | **Fail** |
| **10** | **201,1,1** | **InvalidInput** | **InvalidInput** | **Pass** |
| **11** | **150,1,1** | **NotATriangle** | **InvalidInput** | **Fail** |
| **12** | **0,3,4** | **InvalidInput** | **InvalidInput** | **Pass** |
| **13** | **0,5.5,4** | **InvalidInput** | **InvalidInput** | **Pass** |

Almost every test case I tried failed, there seem to be many bugs. By the looks of the results, no input I pass makes it to the if statement for checking the triangles. There must be some bugs in the checks at the beginning of the function. It did catch that 5.5 is not an int, that part of the code seems to be working as expected. It also caught that 0 and 201 are invalid input.

Part 2 (Testing the revised Triangle.py):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test ID** | **Input** | **Expected Results** | **Actual Result** | **Pass or Fail** |
| **1** | **3,4,5** | **Right** | **Right** | **Pass** |
| **2** | **5,3,4** | **Right** | **Right** | **Pass** |
| **3** | **4,5,3** | **Right** | **Right** | **Pass** |
| **4** | **1,1,1** | **Equilateral** | **Equilateral** | **Pass** |
| **5** | **1,2,3** | **Scalene** | **Scalene** | **Pass** |
| **6** | **2,2,3** | **Isoceles** | **Isoceles** | **Pass** |
| **7** | **2,3,2** | **Isoceles** | **Isoceles** | **Pass** |
| **8** | **3,2,2** | **Isoceles** | **Isoceles** | **Pass** |
| **9** | **200,199,200** | **Isoceles** | **Isoceles** | **Pass** |
| **10** | **201,1,1** | **InvalidInput** | **InvalidInput** | **Pass** |
| **11** | **150,1,1** | **NotATriangle** | **NotATriangle** | **Pass** |
| **12** | **0,3,4** | **InvalidInput** | **InvalidInput** | **Pass** |
| **13** | **3,0,4** | **InvalidInput** | **InvalidInput** | **Pass** |
| **14** | **4,3,0** | **InvalidInput** | **InvalidInput** | **Pass** |
| **15** | **0,5.5,4** | **InvalidInput** | **InvalidInput** | **Pass** |
| **16** | **0,5.5,3.1** | **InvalidInput** | **InvalidInput** | **Pass** |

I think I was able to fix all the bugs in the code, I was able to get all of my test cases to pass. I ended up adding some more test cases because I realized I left some things out. Some things I corrected were testing for all possible versions of a right triangle, a^2 + b^2 = c^2, b^2 + c^2 = a^2, a^2 + c^2 = b^2. Also, the code was not squaring the values. Another thing I fixed was checking if the sum of any 2 sides were greater than the 3rd side. The code was doing subtraction and not addition. I fixed a few other small bugs as well.

|  |  |  |
| --- | --- | --- |
|  | Test Run 1 | Test Run 2 |
| Tests Planned | I planned to check every possible input combination. Checking for all triangles and invalid inputs as well. I checked the boundary cases of 200 and 0 to make sure they work as expected too. Also when I check for right and isoceles triangles I want to check the order of the numbers like a,b,c and b,c,a and c, a, b to make sure all orders work. | I plan on running the same tests as the first run |
| Tests Executed | I ran all the tests that in the chart above. | The same tests were executed |
| Tests Passed | No tests were passed. | All tests were passed |
| Defects Found | I found many defects with these tests. Most tests were resulting in ‘InvalidInput’ so there is a bug with the checking of the sum of the sides being greater than the third side. There also seems to be a bug with checking right triangles. Equilateral check wasn’t checking for the third side as well. | No defects found |
| Defects Fixed | All defects were fixed | No defects to fix |

In conclusion, I found many bugs with the program. Most were small bugs like there being an subtraction sign instead of an addition sign or checking for b==a twice instead of checking a==c. I also noticed that it wasn’t checking for all possible versions of a right triangle. There were a few other bugs that I fixed as well. I think I was able to correct all bugs as all of the test cases are passing successfully.

I learned that there are many different test cases to consider. If you check 3,4,5 as input you should also check 5,3,4 and 3,5,4. They might have a different result when they should be the same. It is almost impossible to check all test cases so you should check groups of them, especially check the boundaries, in this case it is 0 and 200. I also liked writing the test cases in advance of fixing the problem so I knew if I missed any bugs or not.

The code and screenshots are attached in the git repository.