SOFTENG 254:
Quality Assurance

Testing Triangles Tutorial

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Triangle Contest

Triangle Requirements

Inputs: 3 strings, `x`, `y`, `z`, representing the lengths of sides of a triangle in decimal

Output: *Invalid*, *Scalene*, *Equilateral*, *Isosceles*

- Working in your team . . .
- Come up with as many different test cases for any program implementing the Triangle Requirements in the time alloted.
- Your test case should include specific values for inputs, and an explanation of what situation you are testing.
- Be systematic!

Definitions

Triangle Requirements

Inputs: 3 strings, x, y, z, representing the lengths of sides of a triangle in decimal

Output: *Invalid*, *Scalene*, *Equilateral*, *Isosceles*

Triangle A valid triangle must have 3 non-zero positive length sides, with each side shorter than the sum of the lengths divided by 2

$$\mathrm{s} = (\mathrm{x} + \mathrm{y} + \mathrm{z})/2, \mathrm{s} > \mathrm{x}, \mathrm{s} > \mathrm{y}, \mathrm{s} > \mathrm{z}$$

Equilateral $\mathrm{x} = \mathrm{y} = \mathrm{z}$

Isosceles one of $\mathrm{x} = \mathrm{y} \neq \mathrm{z}$, $\mathrm{x} = \mathrm{z} \neq \mathrm{y}$, or $\mathrm{y} = \mathrm{z} \neq \mathrm{x}$

Scalene Neither Equilateral nor Isosceles

Sample Test Case

Inputs: “2”, “2”, “3”

Output: *Isosceles*

Explanation: Testing valid isosceles triangle where first two values are equal.

Comments

- How does the problem change if the inputs are specified as `int`s rather than strings?
- How does the problem change if you are given an implementation of a `Triangle` class to test?
- How does the problem change if the `Triangle` class inherits from another class?
- How does the problem change if the inputs are *points*?

Review

- When deciding whether to keep two test cases, a useful criteria to apply is, “Is it reasonable to expect the IUT to behave differently for these two cases?” If the answer is yes, then keep them both, otherwise probably only need one.
  - different outputs must mean different behaviours — but are the different behaviours worth testing separately?
    - Input = (” Lorem”, 8), Expected Output: 2
    - Input = (” Lorem ipsum”, 8), Expected Output: 3

Review

- Some test cases may test multiple situations at once. This is why it can be difficult to isolate a fault just from a failed test case
  - E.g. `"1.5", "1.5", "1"` (expected “Isosceles”) tests whether a general isosceles case is done correctly, as well as parsing non-integer values, and potential rounding issus

  Ideally want test cases that test only one aspect, but that is often difficult to achieve
- Describing requirements completely is difficult

  ⇒ note any situations that do not seem to be covered by the requirements as stated (i.e. don’t just ignore such cases)

Journal Discussion (5-10 mins)

- In groups of 2-3, share your journals/notes with your peers and discuss them.
  - What? – what others wrote and you did not
  - Why? – why did you not write what you did not
  - How? – given the same content, how your notes differ from your peers' notes; different forms of representation? drawings? short-hands? what else?
  - Learn to note better!!!

Post-it notes…

- Please take a moment to write a one sentence answer to each of the following questions:
  - What is your primary takeaway from this lecture? (one sentence)
  - What did you not understand from this lecture? (one sentence)

Rate this Lecture

- Go to **www.menti.com** and enter code **91 22 75**
- See you next week!

- *Meanwhile*
  - Utilize office hours (Tuesdays and Fridays 2:00 – 3:00 pm)
    - **Zoom** – See Canvas
  - Discuss with your peers and the teaching team on **Piazza**
  - Work on **Assignment 1** and practice **Lab** exercises
- And most importantly
  - Stay safe and maintain good hygiene