## Q14. Height of Triangle (20 marks):

Triangles are categorized into three types based on the lengths of their sides: equilateral, isosceles, and scalene. The process of determining the height, h, of a triangle varies depending on its type. The selection of the base is particularly important for isosceles and scalene triangles, as the height (or altitude) is perpendicular to the base, and its position affects the value of the height. For a clearer understanding of how to choose the base for each type of triangle, refer to the guidelines and accompanying figure below:

1. **Equilateral triangle:** All sides are of equal length, meaning any side can serve as the base. To calculate h, only the length of one side, x, is needed.
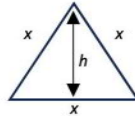
2. **Isosceles triangle:** While any side can technically act as the base, the side differing in length from the other two is typically chosen. To ascertain h, you'll require the lengths of one equal side, y, and the base, z, as depicted in the figure below.
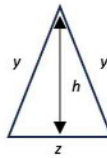
3. **Scalene triangle:** With all sides differing in length, the choice of base is vital. The height's length will vary depending on the chosen base. For determining h, the lengths of all three sides, a, b, and c, are necessary. In the figure below, a is illustrated as the chosen base.
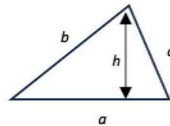
Write a programme to

Input, in sequence

(1) The type of triangle by entering a number t where:
   - 1 represents an Equilateral Triangle
   - 2 represents an Isosceles Triangle
   - 3 represents a Scalene Triangle;
(2) The respective side length based on the triangle type chosen as below:
   - Equilateral Triangle: Length of one side, x.
   - Isosceles Triangle: Lengths of one equal side, y and the base, z.
   - Scalene Triangle: Lengths of three sides where, the first entry, a, is the base, followed by b and c, the lengths of the other two sides.

Output

The height, h, of the triangle, rounded to 4 decimal places, including trailing zeros.
Note: Display "Invalid" if the triangle cannot be formed from the input of side length(s).
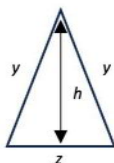
试题 14.三角形的高度(20 分):

根据其边的长度，三角形可分为三种类型：等边、等腰和不等边三角形。确定三角形的高度 h 的过程因其类型而异。对于等腰和不等边三角形，选择基底尤为重要，因为高度垂直于基底，而基底的选择会影响高度的值。为了更清晰地理解如何为每种类型的三角形选择基底，请参考下面的指南和附带的图形：
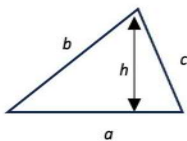
1. **等边三角形**：所有边的长度都相等，这意味着任何一边都可以作为底边。要计算高度 h，只需要一个边的长度，即 x，就足够了。
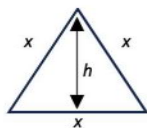
2. **等腰三角形**：从技术上讲，任何一边都可以作为底边，但通常选择与其他两边长度不同的那一边作为基底。要确定 h，您需要知道一个相等的边的长度，即 y，和底边的长度，即 z，如下图所示。

3. **不等边三角形**：由于所有边的长度都不相等，选择哪一边作为底边非常关键。根据所选的底边，高度的长度会有所不同。为了确定 h，需要知道所有三个边的长度，a、b 和 c。在下图中，a 被选定为底边。

试写一程式以

依序输入

(1) 一个数字,t, 以决定三角形的类型：
   - 1 代表等边三角形
   - 2 代表等腰三角形
   - 3 代表不等边三角形;

(2) 然后根据三角形的类型输入边长，其规则如下所示：
   - 等边三角形：提供一边的长度，记为 x。
   - 等腰三角形：提供一个相等的边的长度，记为 y，和底边的长度，记为 z。
   - 不等边三角形：输入所有三个边的长度。在这里，率先输入的 a 被视为底边，接着后面是其他两边的边长，b 和 c。

输出

三角形的高度,h。你的答案必须近似至小数点后四位数,包括尾随的 0。

请注意,如果无法从输入的边长值形成三角形，则显示"Invalid"。

Example (例子)

Input (输入)	Output (输出)
1 8	6.9282
2 54 36	50.9117
3 32.4 16.0 40	15.3422
2 8 16	Invalid
3 3 4 5	4.0000