Welcome

...to the 2018 Fall semester of CS 1371! Before beginning your first homework, you should take a look at the **CS1371_HomeworkGuide.pdf** and **testingYourCode.pdf** files included in the .zip file for this homework. These documents detail everything you need to know about completing this and future homeworks. The document about testing your code also includes information about testing functions with output types that have not been taught yet. You can ignore this part of the document for now, but will probably want to save it as a reference for later in the semester.

If you have not yet downloaded MATLAB you can click here to download it from GT OIT. Once you have MATLAB installed, and you have read and understood the documents above, you can start on this homework.

Happy coding!
~Homework team

Function Name: `pythag`

Inputs:

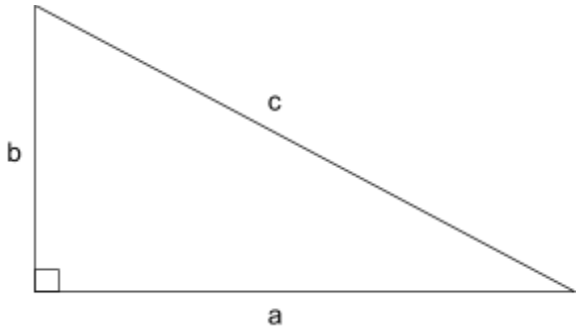
1. *(double)* Length of side a
2. (*double*) Length of side b

Outputs:

1. *(double)* Length of the hypotenuse, c

Function Description:

You're fascinated with triangles, so naturally you love the Pythagorean theorem. The Pythagorean theorem states that when a triangle has a right angle, the square of the longest side (hypotenuse) is equal to the sum of the squares of the other two sides.



$$a^2 + b^2 = c^2$$

Given the side lengths of a right triangle, a and b, use MATLAB to determine the length of the hypotenuse, c. Now you'll never have to do this calculation yourself again!

Notes:

- Round your answer to the hundredths place (second decimal place).

Hints:

- The `sqrt()` and `round()` functions will prove useful.

Function Name: `trig`

Inputs:

1. (*double*) The angle θ, in degrees, of a right triangle
2. (*double*) The length the hypotenuse of a right triangle

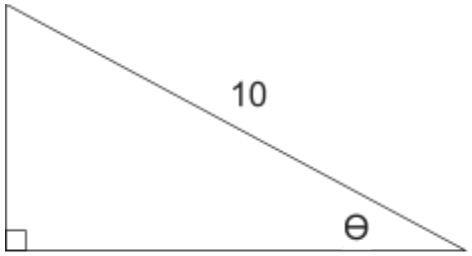
Outputs:

1. *(double*) The length of the side adjacent to angle θ
2. *(double*) The length of the side opposite to angle θ

Function Description:

Continuing your fascination with triangles, you decide to explore the sine and cosine functions. Write a function that takes in an angle in degrees and the length of the hypotenuse, and returns the length of the adjacent side and the length of the opposite side. The angle θ is guaranteed to be a valid angle, as in greater than 0 degrees and less than 90 degrees.

Example:




```
[adj, opp] = trig(30,10)
--> adj = 8.66
--> opp = 5
```

Notes:

- Round both outputs to the 2 decimal place

Hints:

- You may find the `sind()` and `cosd()` functions helpful

Function Name: `herons`

Inputs:

1. (*double*) Side length *a*
2. (*double*) Side length *b*
3. (*double)* Side length *c*

Outputs:

3. *(double*) The area of the triangle with side lengths *a*, *b*, and *c*

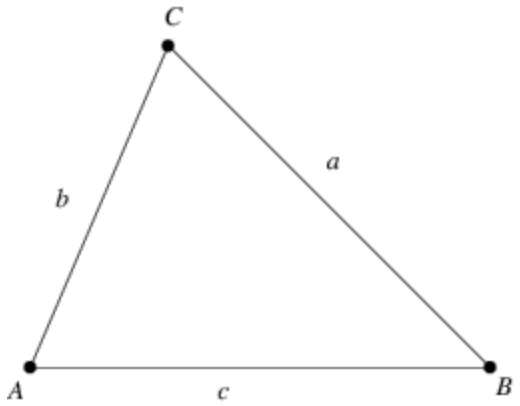
Function Description:

In his book *Metrica* in 60 C.E., Heron of Alexandria proved that the area of any triangle is a function of its three side lengths according to the following formula.

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

where *s* is the semiperimeter of the triangle; that is

$$s = \tfrac{1}{2}(a + b + c)$$



Write a function that takes in the side lengths of a triangle and returns that triangles area.

Notes:

- Round your final area to the nearest hundredth.

Function Name: `extAngles`

Inputs:

1. (*double*) Interior angle of a regular polygon

Outputs:

1. *(double*) Number of sides of the polygon

Background:

After coming to know and love triangles and all of their amazing mathematical properties, you decide to venture away from the familiar three-sided shapes into the world of multi-sided polygons!

Function Description:

A regular polygon is a polygon where all the sides and angles are the same, like a square or an equilateral triangle. You also remember that a formula that relates the number of sides of a regular polygon to its interior angle is

$$\theta = \frac{180(n-2)}{n}$$

In this equation, θ is the interior angle in degrees and n is the number of sides. Write a function in MATLAB that calculates the number of sides given the interior angle.

Example:

```
extAngles(90) => 4
```

Notes:

- If you're not convinced, try plugging in $n = 3$ or $n = 4$. You should get 60 and 90, which is the angle measurement of an equilateral triangle and a square, respectively.
- You are guaranteed to be given a positive integer number of sides.