

**Quote of the day:** “If it doesn’t challenge you, it won’t change you”.

## **FUNCTIONS**

### **Exercise 1**

Given the following code:

```
def mysteryNumber(x):  
    x = x*x  
    print("The value of x is now ", x)  
  
x = 2  
print("Value of x is", x)  
mysteryNumber(x)  
print("The value of x after calling mysterNumber is: ", x)
```

Without using Python, what do you think the value of x is? Now run your code and see if you guessed correctly! Use [www.pythontutor.com](http://www.pythontutor.com) to understand how the value of x changes.

P.S. Type the code into Python, if you copy/paste you will get syntax errors!

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### **Exercise 2**

[Fermat's Last Theorem](#) (sometimes called Fermat's conjecture, especially in older texts) states that no three positive integers a, b, and c satisfy the equation

$$a^n + b^n = c^n.$$

For any integer value of n greater than 2.

Write a function named checkFermat that takes four parameters (a, b, c and n) that checks to see if Fermat’s theorem holds.

If n is greater than 2 and it turns out that the theorem is true then the program should print, “Holy smokes, Fermat was wrong!” Otherwise the program should print, “No, that doesn’t work.”

Interesting fact, professor Andrew Wiles, proved that Fermat [was wrong](#) and won a Nobel Prize!

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### **Exercise 3**

The date 5 February 2010 is called a magic date because when it is written as follows the month times the day equals the year: 5/2/10. Write a function that receives as parameter a day, month as a number and a two-digit year and returns true if the year is a magic date, false otherwise.

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#### Exercise 4

Write a function that takes three numbers as parameters, and returns the median value of those parameters as its result. Include a main program that reads three values from the user and displays their median.

Hint: The median value is the middle of the three values when they are sorted into ascending order.

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#### Exercise 5

Write a function called gcd that takes two numbers (x and y) and returns the greatest common divisor of those numbers by employing the Euclides algorithm. Assuming that x is greater than y you must follow this algorithm:

```
Divide x by y and get the remainder r
While r is different to 0
    set x to the value of y
    set y to the value of r
    set r to the remainder of x divided by y

return the gcd which is y
```

Make sure that the function works by testing it with some testing data. You can test the function in the python shell. Think about possible cases:

- Two prime numbers
  - Same number twice
  - Two numbers with common factors
  - Two numbers with no common factors
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#### Exercise 6

If you are given three sticks, you may or may not be able to arrange them in a triangle. For example, if one of the sticks is 12 inches long and the other two are one inch long, it is clear that you will not be able to get the short sticks to meet in the middle. For any three lengths, there is a simple test to see if it is possible to form a triangle:

If any of the three lengths is greater than the sum of the other two, then you cannot form a triangle. Otherwise, you can. (If the sum of two lengths equals the third, they form what is called a “degenerate” triangle).

Write a function named `is_triangle` that takes three integers as arguments, and that returns true or false depending on whether you can or cannot form a triangle from sticks with the given lengths.

Next, write program that prompts the user to input three stick lengths and uses `is_triangle` to check whether sticks with the given lengths can form a triangle and displays a message to the user.