



## MIT AITI

### Lab 05: Methods

This lab introduces methods.

#### Problem 1:

- a. What will the following output?  

```
def do(thing):  
    return str(thing) + str(1)  
do(5)?
```
- b. What will the following output?  

```
def do(one, two=5):  
    return one+two  
do(5)?
```
- c. What will the following output?  

```
def do(a,b):  
    a=5  
    b=5  
    return a*b  
  
inp = 8  
do(inp,5)  
print inp
```
- d. What will the following output?  

```
def try_to_change_list_contents(the_list):  
    the_list.append('four')  
  
outer_list = ['one', 'two', 'three']  
  
try_to_change_list_contents(outer_list)  
print outer_list
```
- e. What will the following output?  

```
def do(a, f):  
    return a*f(a)  
def inp(a):  
    return a*2  
  
print do(6,inp)
```

NOTE: Save all of the following functions(problems 2-7) into a file called Lab05.py. Make sure all functions are named as specified in each of the problems. If you want to test your work, you should put Lab05.py in the same folder as our tester and use the command line to navigate to that folder and run: python tester.py

If you need any clarifications on this, don't hesitate to ask.

**Problem 2:**

Make a function called `factorial` that takes an integer as an input and returns that number factorial. For example, if the argument is 5, the return value is 120

**Problem 3:**

Make a function called `fibonacci` that takes an integer `n` as an input, and returns a list containing the first `n` fibonacci numbers. For example, if the argument is 5, the return value is `[1,1,2,3,5]`.

**Problem 4:**

Remember our “print the first 50 prime numbers” problem that you all loved so much? Well, now using that code, make a function called `prime` that takes integer as an argument and returns `True` if the integer is prime, `False` otherwise.

**Challenge Problems:**

**Problem 4:**

Write a procedure, called `isPalindrome`, that takes a string as an argument and returns `True` if the string is a palindrome, that is, if the string is identical to the reversed string. It should return `False` otherwise.

Some examples are:

```
'able was I ere I saw elba'
```

Note that this works even with the spaces.

The one below would require removing the spaces to be a palindrome:

```
'a man a plan a canal panama'  
'amanaplanacanalpanama'
```

For this problem, we will not consider it a palindrome.

Note that you can check for a palindrome without needing to actually reverse the string by pairing up the appropriate letters to test. Try to do it that way.

Recall that `str[-n]` gives you the  $n^{\text{th}}$  character counting from the end, so `x[-1]` is the last character in the string.

**Problem 5:**

Write a procedure, called `isSubstring`, that takes two strings as inputs and returns `True` when the first string is a substring of the second one, that is, when all of the characters in the first string occur contiguously in the second string.

The simplest strategy is to try simple letter-by-letter matching of the first string starting at every possible location on the second one. Of course, only locations that allow the full first string to overlap the second one need to be tried. So, for example, to see if 'foo' is a substring of 'barfoobar', try to see if 'foo' matches starting at position 0, that is, 'barfoobar', or if it matches starting at position 1, that is, 'arfoobar', or at position 2, 'rfoobar', or at position 3, 'foobar', which it does. There are many faster algorithms, but this one will do for this exercise. Note that this approach is best implemented using a helper procedure.

### **Problem 7:**

You, Fred, and Jill just took a multiple choice test (answers A,B,C,D for each question) and you get a 0. Determine the maximum combined score of Fred and Jill, given strings of equal lengths for each person (you first) and that none of your answers are right.

Example:

AAABCD A

ADDBACA

ADCADD C

returns 7