

# COMP10001 Foundations of Computing

## Semester 2, 2016

### Tutorial Questions: Week 6

1. For the following list comprehensions: (a) evaluate the expression; and (b) write the corresponding Python code which would generate an object of the same content, without using a list comprehension (using `for` statements, etc.):

- (a) `[float(i) for i in range(0,4)]`
- (b) `"".join([letter.upper() for letter in "hello"])`
- (c) `[i**2 for i in range(5) if i % 2 == 0]`

2. What is the output of the following code:

```
def foo(x, y):
    global a
    a = 42
    x, y = y, x
    b = 17
    c = 100
    print a, b, x, y

a, b, x, y = 1, 2, 3, 4
foo(17, 4)
print a, b, x, y
```

3. Compare the following two functions with respect to the given function calls, and answer the following questions. (1) Are there inputs for which the output of the two functions will differ? (2) Are there instances where one version should be preferred over the other?

```
def noletter1(wordlist, letter='z'):
    for word in wordlist:
        if letter in word:
            return(False)
    return(True)

def noletter2(wordlist, letter='z'):
    noz = True
    for word in wordlist:
        if letter in word:
            noz = False
    return(noz)

wordlist = ['zizzer'] + ['aadvark'] * 10000000
print(noletter1(wordlist))
print(noletter2(wordlist))
```

4. Write a function `hypotenuse(a, b)` that returns (as a `float`) the length of the hypotenuse of a right-angled triangle with side lengths `a` and `b` (both positive numbers). Use Pythagoras' theorem  $a^2 + b^2 = c^2$ , and the implementation of square root in the `math` library (`math.sqrt`).
  
  
  
  
  
  
  
  
  
  
5. Using a `defaultdict`, write a function `hapax(text)` which returns an orthographically sorted list of all words in `text` that occur exactly once. Note that a “word” is defined simply to be a string that is surrounded by white space.

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#### OPTIONAL EXTENSION QUESTIONS FOR SELF-STUDY

A palindromic number is a positive integer that reads the same both ways. The largest palindromic number made from the product of two 2-digit integers is  $9009 = 91 \times 99$ .

Write a function `palnum(num)` that returns the largest palindromic number made from the product of two `num`-digit numbers.