CS101 midterm exam (1)

- Be sure to enter your information to start
- Do not turn this page until instructed to
- There are 10 multi-choice questions and 5 programming problems to finish
- You must not communicate with other students during the exam
- You must not use any electronic devices during the exam
- Any violations detected will result in a penalty up to full credit loss
- This is a 45-minute exam

Part A, Fill in your information

Full Name : _____

UIN (student ID) : _____

Session (A/B) : _____

Part B, multi-choice questions

This part has 10 questions for python programming language basics. There is only one correct answer to each question unless otherwise stated. Please fill in your answers on the back of page 2.

1. (1 point) Consider the following program:

```
x = ['foo', 'bar']
sorted(x).reverse()
x[0],x[-2] = x[-2],x[0]
```

What is the value of x after the program is run?
(A) ['foo', 'bar']
(B) ['foo', 'foo']
(C) ['bar', 'bar']
(D) ['bar', 'foo']
(E) None of the above

2. (1 point) Consider the following program:

```
def fun(a, b):
    c = (a+ ' ')*len(b)

x = fun('ab', 'abc')
```

What is the value of x?

(A) 'ab ab ab'

(B) 'ababab'

(C) 'ab ab ab '

(D) 'AbAbAb'

(E) None of the above

3.   (1 point) Consider the following program:

a = 3

b = list('hello')

c = a < 5 or len(b.append('world')) == 10

What is the value of b?

(A) True

(B) 'hello'

(C) ['h', 'e' , 'l' , 'l' , 'o']

(D) ['h', 'e' , 'l' , 'l' , 'o' , 'world']

(E) ['h', 'e' , 'l' , 'l' , 'o' , 'w', 'o', 'r', 'l', 'd']

4.   (1 point) Consider the following program:

s = 'WATER MAIN'

x = s[s.find(' ')+1:]

x = x.title().swapcase()

What is the value of x?

(A) 'Main'

(B) 'MAIN'

(C) 'main'

(D) 'mAIN'

(E) ' mAIN'

5.   (1 point) Consider the following program:

```
def fun(a):
    if a == 1:
        return 1
    else:
        return a*fun(a-1)
x = fun(100)
```

How many times the function *fun* is invoked to compute x?

(A) 1

(B) 99

(C) 100

(D) (Roughly) 2^{100}

6. (1 point) Consider the following program:
'#'.join('AbAbbAb'.split('b'))

What is the value produced?
(A) 'A#A#A#'
(B) 'A#A#A'
(C) 'A#A##A'
(D) 'A#A##A#'

7. (1 point) Consider the following program:
a = list(range(10))
a.append(a[:])
a.extend(a)

What is the length of a after the program is run?
(A) 10
(B) 12
(C) 22
(D) 40
(E) None of the above

8. (1 point) Consider the following program:
for i in [1,2,3,4,5][0:-5]:
     print(i)

What is the last value to be printed?
(A) 1
(B) 2
(C) 4
(D) 5
(E) None of the above

9. (1 point) Consider the following program:
a = list('Mississippi')
a.reverse()
a[0], a[-1] = a[-1],a[0]
x = ''
for c in a:
     x = c + x
(A) 'Mississippi'
(B) 'iississippM'
(C) 'Mppississii'
(D) 'ippississiM'
(E) None of the above

10. (1 point) Python is:

(A) a compiled language

(B) an interpreted language

(C) an imperative programming language

(D) a declarative programming language

(E) a procedural language

(F) a high level language

(There are possibly multiple correct answers. Try pick them all)
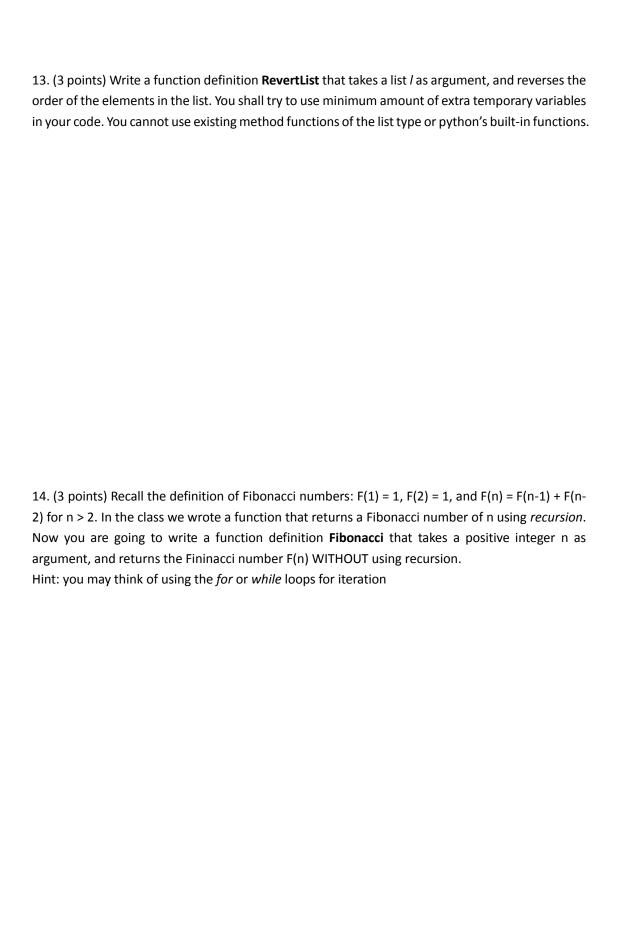
Your Final Answers for Part B here:

1	2	3	4	5	6	7	8	9	10

Part C, programming hackathon

This part has 5 programming problems to finish. You shall only use python as the programming language. There may be different ways to write the programs. You may take whichever way that achieves the goal. Please read the problem definitions carefully.

11. (3 points) Write a function definition **Is_Equal** that takes two floating point numbers a and b as augments, and returns a Boolean type value. The returned value is True if and only if the difference of the two inputs a and b is less than a small value *1e-7*, or False if not.

12. (3 points) Write a function definition **Is_Primal** that takes a single positive integer n as argument, and returns True if n is a prime number, or False if it is not. A primal number is an integer that is greater than 1 and has no positive divisors other than 1 and itself (like 2, 3, 5, 7, 11…)

13. (3 points) Write a function definition **RevertList** that takes a list *l* as argument, and reverses the order of the elements in the list. You shall try to use minimum amount of extra temporary variables in your code. You cannot use existing method functions of the list type or python's built-in functions.

14. (3 points) Recall the definition of Fibonacci numbers: F(1) = 1, F(2) = 1, and F(n) = F(n-1) + F(n-2) for n > 2. In the class we wrote a function that returns a Fibonacci number of n using *recursion*. Now you are going to write a function definition **Fibonacci** that takes a positive integer n as argument, and returns the Fininacci number F(n) WITHOUT using recursion.

Hint: you may think of using the *for* or *while* loops for iteration

15. (5 points) The international campus of Zhejiang University in Haining now has 500 people (students, faculty and staff). And they all go to the only canteen in campus for lunch every day. The canteen provides Western food and Chinese food. On the first day of the semester, half of the people went for the Western food, and the rest half went for Chinese food. According to past experience, if a person had Western food for lunch, then there is a probability 0.3 that he/she will switch to Chinese food for lunch next day. And if a person had Chinese food, then there is a probability 0.2 that he/she will switch to Western food for next day's lunch.

Now you are asked to write a python program (a script) to predict the number of people who will take Western food and the number of people who will take Chinese food in the next 30 days. Your program will help the canteen manager to decide how much food to prepare in each category. Hint: python library function *numpy.random.randint(n)* returns a random integer number uniformly sampled from 0, 1, 2 … n-1

Your program should print out something like (replace XXX with result computed by your program):
Day 1: XXX for Western food, XXX for Chinese food
Day 2: XXX for Western food, XXX for Chinese food
…
Day 30: XXX for Western food, XXX for Chinese food

--end--