

# 上海交通大学试卷(期终-A)

( 2010 至 2011 学年 第\_\_学期 )

班级号 \_\_\_\_\_ 学号 \_\_\_\_\_ 姓名 \_\_\_\_\_  
课程名称 Programming Thinking and Method 成绩 \_\_\_\_\_

**Note: You can give your answers in English or Chinese.**

## 1 Multiple Choices (28 marks)

**Please pick out a correct answer with a tick (“√”) for each chosen question.**

- 1) What is the output result after we execute the following statements?  

```
>>> world = "world"  
>>> print "hello" + world
```

A. helloworld	B. "hello"world
C. hello world	D. there occurs a syntax error
  
- 2) Which variable name in the following is **LEGAL**?  

A. i'm	B. sum_1
C. 3Q	D. for
  
- 3) If we want to calculate an average value for *sum* and *count*, which statement in the following is **CORRECT**?  

A. avg = sum / count	B. avg = float(sum / count)
C. avg = float(sum) / count	D. the above statements are all the same
  
- 4) Which of the following boolean expressions is **CORRECT**?  

A. x in range(6)	B. 3 = a
C. e > 5 and f = 4	D. (x - 6) > 5

我承诺，我将严格遵守考试纪律。

承诺人：\_\_\_\_\_  
(Signature)

题号	一	二	三	四	五
得分					
批阅人(流水阅卷教师签名处)					

5) When *s* is assigned by "Happy New Year", what is **CORRECT** result of the statement `print s[3:8]`?

- A. ppy Ne                      B. py New  
C. 'ppy N'                      D. py Ne

6) What is **CORRECT** returned result of the function `type(1 + 2L * 3.14)`?

- A. <type 'int'>              B. <type 'float'>  
C. <type 'long'>              D. <type 'str'>

7) After the following two statements are executed, what is the **CORRECT** result?

```
>>> from math import sqrt
>>> print sqrt(3) * sqrt(3) == 3
```

- A. False                      B. True  
C. 3                              D. `sqrt(3)*sqrt(3) == 3`

8) After the following statements are executed, what is the **CORRECT** result?

```
>>> matrix1 = {(0,3): 1, (2, 1): 2, (4, 3): 3}
>>> matrix2 = matrix1
>>> matrix3 = matrix1.copy()
>>> matrix2[(2, 1)] = 4
```

```
>>> print matrix1[(2, 1)], matrix3[(2, 1)]
```

- A. 2 2                      B. 2 4  
C. 4 2                      D. 4 4

- 9) Suppose  $k$  is an integer variable, how many times are executed the loop of the *while* statement?

```
k = 2  
while k == 0:  
    print k  
    k = k - 1  
    print "\n "
```

- A. 10                      B. 9  
C. 0                      D. 1

- 10) Python uses \_\_\_\_\_ statement to enable exception handling.

- A. until:                      B. try:  
C. else:                      D. finally:.

- 11) The insert and remove operations of a queue are known as \_\_\_\_\_ and \_\_\_\_\_ respectively.

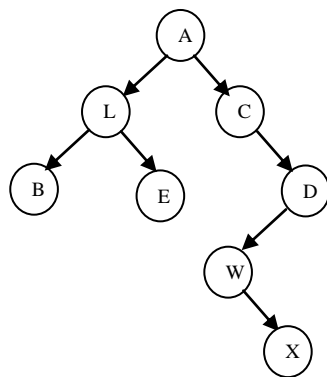
- A. enqueue, dequeue                      B. push, pop  
C. insert, remove                      D. None of the above

- 12) A binary search tree (with no duplicate node values) has the characteristic that the values in any left subtree are \_\_\_\_\_ the value in the subtree's parent node, and the values in

any right subtree are \_\_\_\_\_ the value in the subtree's parent node.

- A. greater than, less than                      B. equal to, greater than  
C. less than, greater than                      D. None of the above

- 13) Which one in the following is the **CORRECT** traversal result of the post order for the following tree?



- A. BLEACWXD                      B. ALBECDWX  
C. BELCAXWD                      D. BELXWDCA

- 14) If a list has  $n$  elements, which one in the following is the **CORRECT** time complexity when we adopt merge sort algorithm?

- A.  $O(n \log_2 n)$                       B.  $O(\log_2 n)$   
C.  $O(n^2)$                               D.  $O(n)$

## 2 Detection of Errors and Determination of Reasons and Types in the Program (10 marks)

Please find the errors, analyze the reasons and types in the following program and then fill the table:

The following program is to find the maximum length for words in the word\_list. If the word\_list is ['a', 'apple', 'pear', 'grape'], the correct output result is 5.

```
def longestWord(word_list):
    for word in word_list:
        length = length(word)
        while length >= longest:
            longest = length
    return longest

print longestword(['a', 'apple', 'pear', 'grape'])
5
```

Error Position (Statement)	Error Reason	Error Type

### 3 Fill in Blanks in the Program (18 marks)

Please read the following program and fill in all the blanks indicated by numbers, so that it becomes a complete and correct program:

- a) A **prime number** (素数) is a natural number that has exactly two distinct natural number divisors: 1 and itself. The following program can output the prime numbers between 100 and 200.

\_\_\_\_\_ (1) \_\_\_\_\_

```
n = 0
for m in range(101, 201, 2):
    if n % 30 == 0:
        print "\n"
    k = (int)(math.sqrt(m))
```

```

for i in range(_____(2)_____, k+1):
    if m % i == 0:
        _____(3)_____
    if i == _____(4)_____:
        print "%d " % m
        n = n + 1

```

(1) \_\_\_\_\_;    (2) \_\_\_\_\_;    (3) \_\_\_\_\_;

(4) \_\_\_\_\_.

- b) The following program can **descendingly** sort positive or negative numbers stored in a list using a selection-sort algorithm.

```

def selsort(_____(1)_____):
    for i in range(n - 1):
        _____(2)_____
        for j in range(i + 1, n):
            if _____(3)_____:
                k = j
            list[k], list[i] = list[i], list[k]

def main():
    list = []
    numStr = raw_input("Enter a number (<Enter> to quit) >> ")
    while numStr != "":
        list.append(eval(numStr))
        numStr = raw_input("Enter a number (<Enter> to quit) >> ")
        _____(4)_____
    print "the sorted list:\n"
    for i in range(len(list)):
        print "%d " _____(5)_____
    print "\n"

```

main()

(1) \_\_\_\_\_;    (2) \_\_\_\_\_;    (3) \_\_\_\_\_;

(4) \_\_\_\_\_;    (5) \_\_\_\_\_.

#### 4 Execution of the Program (24 marks)

Please manually execute the following programs and give the correct output results with the correct format. Except for the above requests, note that you must draw a flowchart for the program c).

a)

```
def invert(l2, i, j):  
    if i < j:  
        invert(l2, i + 1, j - 1)  
        l2[i], l2[j] = l2[j], l2[i]  
    return  
  
def main():  
    l1 = [10, 6, 23, -90, 0, 3]  
    invert(l1, 0, len(l1) - 1)  
    for i in range(len(l1)):  
        print l1[i],  
        print "\n"  
  
main()
```

b)

```
def reverse(s):  
    if s == "":  
        return s  
    else:  
        return reverse(s[1:]) + s[0]  
  
print reverse("Happy New Year")
```

c) **Note: You must draw a flowchart for this program.**

```
i = 1
while i < 10:
    if i > 4:
        print "%d" % i
        i = i + 1
        break
    print "%d" % i
    i = i + 2
```

d)

```
def isEven(n):
    if n == 0:
        return True
    else:
        return isEven(n - 1)
```

```
def isOdd(n):
    if n == 0:
        return False
    else:
        return isEven(n - 1)
```

```
print isOdd(3)
```



## 5 Problem-solving Programming (20 marks)

**Problem description:** Given a sequence  $s = \{s_1, s_2, \dots, s_n\}$  ( $n$  is an integer and equal to or greater than 1), in which it contains positive integer, negative integer, or zero. **Maximum Contiguous Subsequence Sum (MCSS)** is the contiguous subsequence which has the largest sum, that is,

$$\max_{1 \leq i \leq j \leq n} \sum_{k=i}^j s_k.$$

If all the numbers in the sequence are negative, we define that its MCSS is zero. Thus, MCSS can be uniformly defined as follows:

$$\max \left\{ 0, \max_{1 \leq i \leq j \leq n} \sum_{k=i}^j s_k \right\}.$$

For example, for the sequence  $s = \{-2, 1, -3, 4, -1, 2, 1, -5, 4\}$ . Its contiguous subsequence  $\{4, -1, 2, 1\}$  has MCSS, e.g.,

$$\sum_{k=4}^7 s_k = 6.$$

### Requirements:

- Indicate the problem type.
- Specify a solving strategy, whose corresponding time complexity of the algorithm must be less than or equal to  $O(n^2)$ .
- Write a Python program including two functions `input_sequence()` and `findMCSS(n, seq)`.  
In the function `input_sequence()`, suppose a sequence only contains integers, you must input this sequence string at a time and return a list including the integers in the sequence.  
In the function `findMCSS(n, seq)`,  $n$  is defined as the length of the sequence `seq`. After it finds a subsequence with MCSS, it returns the first and last indexes of this subsequence as well as corresponding MCSS.
- Input / output format: for example,  
Input format: `-2 1 -3 4 -1 2 1 -5 4`  
Output format: `MCSS = 4 + -1 + 2 + 1 = 6`

