上 海 交 通 大 学 试 卷（ A 卷）

（ 2019 至 2020学年 第1学期 ）

班级号\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 学号\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 姓名

课程名称 CS124计算导论 成绩

**Python 3** is the only programming language allowed for this course. **Five problems in all.**

**(1). Please choose the correct answer: Only one is correct for each question. (2 points each, 40 points.)**

1. What is the output of the following code? ( )

a = set('\this problem is very easy\\\n')

print(len(a))

A. 1 B. 16 C. 17 D. 18

2. What is the output of the following code? ( )

print("123123123".count("123123"))

A. 1 B. 2 C. 0 D. 123123

3. How many assertions of the following are True? ( )

i. ["abc"] == list('abc') ii. {"abcd"} == dict('abcd')

iii. ("a") == set('a') iv. "ab" != str('ab')

A. 0 B. 1 C. 2 D. 3

4. What is the output of the following code? ( )

a, b = [1] \* 3, [[1]] \* 3

a[0], b[0], b[1][0] = 5, 5, 5

print(a, b)

A. [5, 5, 5] [[5], [5], [5]] B. [5, 1, 1] [5, [5], [5]]

C. [5, 1, 1] [[5], [5], [1]] D. [5, 1, 1] [5, [5], [1]]

5. How many True values are in the following expressions? ( )

i. 0 < 5 > 2 ii. (0 < 5) > 2

iii. 0 < (5 > 2) iv. 2 < 5 > 0

A. 1 B. 2 C. 3 D. 4

6. How many lines contain numbers in output.txt after running the following code? ( )

modes = ['w', 'w+', 'a', 'r']

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 题号 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |  |  |  |
| 得分 |  |  |  |  |  |  |  |  |  |  |  |  |
| 批阅人(流水阅  卷教师签名处) |  |  |  |  |  |  |  |  |  |  |  |  |

**我承诺，我将严格遵守考试纪律。**

**承诺人：**

for i in range(20):

mode = modes[i % 4]

with open('output.tx', mode) as f:

if f.writable():

for j in range(i):

f.write(str(j) + '\n')

A. 18 B. 19 C. 35 D. 51

7. The definition of the Fibonacci function is as follows. How many times this function is called when calculating Fibonacci(m) ? ( )

def Fibonacci(n):

if n <= 1:

return 1

return Fibonacci(n-1) + Fibonacci(n-2)

A. 2 \* m B. Fibonacci(m) C. 2 \* Fibonacci(m) D. 2 \* Fibonacci(m) – 1

8. Let a=[i % 3 for i in range(0,5)]. The value of a should be: ( )

A. [0,1,2,0,1,2] B.[0,1,2,3,4,5] C.[0,1,2,0,1] D.Syntax Error

9. Given a list alist, which statement cannot obtain the set containing all elements appearing in alist at least twice? ( )

A. {each for each in set(alist) if alist.count(each)>1}

B. set(a) - {each for each in a if a.count(each)==1}

C. {each for i, each in enumerate(alist) if i != alist.index(each)}

D. {each for i, each in enumerate(sorted(alist)) if each == sorted(alist)[i+1]}

10. If a = [1, 5, 4, 6, 8, 5, 3, 1, 3, 5, 7], a[5:-2:1] = ( )

A. [5, 3, 1, 3, 5] B. [5, 3, 1, 3] C. [8, 5, 3, 1, 3, 5] D. [5, 3, 1]

11. Define function func(x) as below:

def func(x):

print(1, end='')

if x ==0:

return

elif x %2==0:

func(x-1)

func(x-1)

else:

func(x-1)

How many "1"s will be printed if we execute func(4)? ( )

A. 5 B.13 C.16 D.20

12. What’s the result of '{1} == {0}'.format(3, 5)? ( )

A. ‘False’ B. ‘3 == 5’ C. ‘5 == 3’ D. Raise an Error

13. Suppose a tuple test=(1,2,3,4,5) contains 5 elements. How can you set the 3rd element of the tuple to a string "SJTU"? ( )

A. test[3]="SJTU"

B. test[2]="SJTU"

C. test(2)="SJTU"

D. Error! Elements of a tuple can't be changed.

14. Here is the code:

a = open('123.txt', 'w')

a.write('123')

a.close()

a = open('123.txt', 'w')

a.write('456')

a.close()

What is the content of the file “123.txt”? ( )

A. “123456” B. “123\n456\n” C. “456” D. “456\n”

15. What is the result of max([ "PYTHON", "JAVASCRIPT", "PHP", "JAVA"])? ( )

A. “PYTHON” B. “JAVASCRIPT” C. “PHP” D. “JAVA”

16. Which of the following codes is valid? ( )

A. a = (1.0,9,3); a[0]=9

B. a = (2.0, 9, 3); print(a \* 3)

C. a = {[1,2,3,4]:4}

D. a = [1,2,3,4,5]; a[0:3] = 3

17. What is the output of following code? ( )

str = "\b".join(["S","J","T","U"])

print(str)

A. SJTU

B. S J T U

C. U

D. S J T U (Each letter is separated into a line)

18. What will we get if we run this code: ( )

a = [1,2,3,4,5,6,7,8]

x = len(a)

r = 0

for i in range(x):

print(a[i], end=",")

r += a[i]

del(a[0])

print(r)

A: 1,2,3,4,5,6,7,8, 36 B: 1,2,3,4, Index Error!

C: 1,2,3,4,5,6,7,28 D: 1,3,5,7, Index Error!

19. What is the output of the following code? ( )

for x in range(8):

if x == 6:

print(x, ': for x inside loop')

print(x, ': x in global')

A. 6 : for x inside loop

7 : x in global

B. 6 : for x inside loop

6: x in global

C. 6 : for x inside loop

0 : x in global

D. Error

20. What is the output of following code? ( )

myset = {'Github', 'StackOverflow', 'LeetCode'}

print(myset.pop() in myset)

A. True B. False C. Syntax Error D. The output can't be determined.

**(2).** Enhanced Knapsack:

Our hard-working TA, Mr. Qi, is planning for his holiday after this semester. He wishes to take a long trip in the western Minhang campus, SJTU.

Good preparation is the key to a wonderful trip. Mr. Qi has checked his inventory, and assigned a "value" to all the objects that he owned. Now, he wants to pack up his knapsack, to carry a bunch of stuffs with highest value.

ps1: Of course, the total weight of objects in the knapsack cannot exceed the knapsack's holding ability w.

ps2: Mr. Qi is rich, so he may have multiple copies of the same object. The number of each object is given by a list stacks\_list.

ps3: You should write a function Knapsack(w, weights\_list, stacks\_list, values\_list), and returns the highest value.

ps4: You can assume that weights\_list, stacks\_list and values\_list have the same length.

ps4pro: Be recursive. DO NOT use itertools.permutation(). **(15 points)**

Example input:

w = 10

weights\_list = [1, 1, 3, 4]

stacks\_list = [1, 5, 5, 1]

values\_list = [5, 1, 1, 10]

print(Knapsack(w, weights\_list, stacks\_list, values\_list))

Example output:

20

Explanation:

Mr. Qi picked 1\*object0, 5\*object1 and 1\*object3.

def Knapsack(w, weights\_list, stacks\_list, values\_list):

**(3).** Climbing Stairs: You are climbing a stair case. It takes n steps to reach to the top. Each time you can either climb 1 or 2 steps. In how many distinct ways can you climb to the top? **(15 points)**

Note: Given n will be a positive integer.

def number\_ways(n):

**(4).** Given two matrices A and B, write a function to compute their matrix product (i.e. C = AB). For example,

A = [[1,2,3], [4,5,6], [7,8,9]]

B = [[1,2,100], [3,4,200], [5,6,300]]

def MatMul(X, Y):

……

C = MatMul(A, B)

print(C)

Please write your MatMul(). Be careful to deal with some invalid input. **(15 points)**

def MatMul(X, Y):

**(5).** Given a string date representing a Gregorian calendar date formatted as YYYY-MM-DD, return the day number of the year. **(15 points)**

Example 1:

Input: date = "2019-01-09"

Output: 9

Explanation: Given date is the 9th day of the year in 2019.

Example 2:

Input: date = "2019-02-10"

Output: 41

Constraints:

• date.length == 10

• date[4] == date[7] == '-', and all other date[i]'s are digits

• date represents a calendar date between Jan 1st, 1900 and Dec 31, 2019.