

考试试卷
Examination Paper A

Fall Semester of 2020-2021 Academic Year

Introduction to Computer Science and Programming
Midterm Examination

班级 (Class):

学号 (Student Number):

姓名 (Name):

成绩 (Score):

November 9th, 2020

School of General Engineering

Examiners use only:

	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8
Score								
	Task 9	Task 10	Task 11	Task 12	Task 13	Task 14	Task 15	Task 16
Score								

Total Score (max. 100):

Remarks:

- This examination is *closed-book* and *paper-pencil/pen*. That means, you are *not* allowed to use any additional material!
- In total, you have 90 minutes for solving all 16 tasks.

Task 1 *Tracing Python programs* (5 points / 5 minutes): Please write down the output of the following Python code.

```
def f(L):
    if len(L)==1:
        return L
    else:
        return f(L[1:])+[L[0]]
print(f([1,5,4,3]))
```

Output of the code:

Task 2 *Tracing Python programs* (5 points / 5 minutes): Please write down the output of the following Python code.

```
def f(n):
    res=''
    while(n>0):
        res=str(n%2)+res
        n=n//2
        print(res)
    return int(res)
f(10)
```

Output of the code:

Task 3 *Tracing Python programs* (5 points / 5 minutes): Please write down the output of the following Python code.

```
def f(n):
    if n==1:
        return [[1],[0]]
    elif n>1:
        res=[]
        for L in f(n-1):
            res.append(L+[0])
            res.append(L+[1])
        return res
print(f(3))
```

Output of the code:

Task 4 Tracing Python programs (5 points / 5 minutes): Please write down the output of the following Python code.

```
def f(n,L):
    if len(L)<n:
        X=[1]*(len(L)+1)
        for i in range(0,len(L)-1):
            X[i+1]=2*(L[i]+L[i+1])
        f(n,X)
    print (L)
f(4,[1])
```

Output of the code:

Task 5 Tracing Python programs (5 points / 5 minutes): Please write down the output of the following Python code. Please note that True is equivalent to 1 and False is equivalent to 0 in numerical Python expressions.

```
def f(a,b,c):
    return (((b>a)*a+(b<a)*b)>c)*c+(((b>a)*a+(b<a)*b)<c)*((b>a)*a+(b<a)*b)
print(f(5,6,10))
```

Output of the code:

Task 6 Writing a Python program (5 points / 5 minutes): Please write a function to find the maximum value of a given list.

Your Python program:

Task 7 Writing a Python program (5 points / 5 minutes): Given $a_0 = 0, a_1 = 1, a_2 = 2, a_n = a_{n-1} + a_{n-2} + a_{n-3}$ ($n > 2, n \in \mathbb{N}$). Please write a recursive Python function to calculate a_n .

Your Python program:

Task 8 *Writing a Python program (5 points / 5 minutes): Please write a recursive Python function to calculate the greatest common divisor of two numbers.*

Your Python program:

Task 9 *Writing a Python program (5 points / 5 minutes):*

1. Write a function $f(x) = 2x^2 + x - 2$. For an input x , $f(x)$ should be output.
2. Please use dichotomy to obtain two approximate roots with the accuracy 0.001 in the range $(0,1)$.

Your Python program:

Task 10 *Writing a Python program (5 points / 5 minutes): Please write a function to check whether a given number n can be written as the product of two smaller, even numbers a and b .*

Your Python program:

Task 11 Debugging a Python program (5 points / 5 minutes): Please debug the following program to achieve the desired output. There are two errors!

```
def addition(a,b):
    res=a+b
    return res
def subtraction(a,b):
    result=a-b
    print(result)
RES=addition(1,1)
print("The result of addition is",res)
print("The result of subtraction is",subtraction(2,1))
```

The desired output of this program should be:

```
The result of addition is 2
The result of subtraction is 1
```

Task 12 Debugging a Python program (5 points / 5 minutes): Please debug the following program to get all the prime numbers from 1 to 20. There are three errors!

```
def checkPrime(data,n=2):
    if data==1:
        return False
    elif data==n:
        return True
    else:
        if data%n!=0:
            checkPrime(data,n-1)
        return False
def getPrimes(i,j):
    L=[]
    for k in range(i,j+1):
        if checkPrime(k)=True:
            L.append(k)
    return L
print(getPrimes(1,20))
```

The desired output of this program should be:

```
[2,3,5,7,11,13,17,19]
```

Task 13 Debugging a Python program (5 points / 5 minutes): Please debug the following program to compare the size of two rectangles. There are three errors!

```
class Rectangle:
    def __init__(length,width,name):
        self.length=length
        self.width=width
        self.name=name
    def get_area(self):
        return self.length*self.width
    def compare_size(self,other):
        if self.get_area<other.get_area:
            print(other.name,"is larger")
        else:
            print(self.name,"is larger")
R1=Rectangle(1,2,"R1")
R2=Rectangle(1,3,"R2")
compare_size(R1,R2)
```

The desired output of this program should be:

```
R2 is larger
```

Task 14 Debugging a Python program (5 points / 5 minutes): Please debug the following program to count the occurrence of words. There are two errors!

```
word_list=["a","b","b","c","c","c"]
count_dict={}
for word in word_list:
    if word in count_dict:
        count_dict[word]=1
    else:
        count_dict[word]+=1
print(count_dict)
```

The desired output of this program should be:

```
{'a': 1, 'b': 2, 'c': 3}
```

Task 15 *Debugging a Python program* (5 points / 5 minutes): Please debug the following program to sort the list with insertion sort algorithm. There are two errors!

```
def InsertionSort(L):
    for i in range (len(L)):
        j=i-1
        while j>=0 and L[j]>L[i]:
            L[j+1]=L[j]
            j-=1
            L[j+1]=L[i]
    return L
print(InsertionSort([5,4,3,2,1]))
```

The desired output of this program should be:

```
[1,2,3,4,5]
```


Task 16 Complex task (15 points / 15 minutes): Please write down the output of the following Python code.

```
x=5
y=2
l=[]
for i in range(y):
    l.append(1)
p=0
while(p>-1):
    if(l[p]>x):
        p-=1
    else:
        if(p==y-1):
            print(l)
        else:
            l[p+1]=l[p]
            p=p+1
    l[p]+=1
```

Additional space for your answers: