SEE1002, Semester B, 2021/22
Midterm Examination
15 March 2022

**There are 4 questions. The total is 74 marks. One handwritten A4 cheat sheet is allowed. Calculators, phones, tablets and laptops are forbidden. Please write your answers on looseleaf paper.**

Name: _____
Student number: _____

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I. [**8 marks**] Choose the best answer.

1. One of the two basic tasks performed by computers is *(a) programming; (b) graphics; (c) Instagram; (d) storing information.*

2. A *(a) function; (b) algorithm; (c) program; (d) dictionary* refers to the data and instructions required to carry out a set of tasks.

3. A *(a) parallel; (b) well-structured; (c) poorly structured; (d) serial* program performs more than one task at a time.

4. *(a) continue; (b) break; (c) pass; (d) return* causes Python to proceed to the next iteration of the loop.

5. *(a) def; (b) while; (c) if; (d) for* can be used to make decisions or introduce branches in the program flow.

6. Data can be compared using *(a) numeric and string operators; (b) relational and logical operators; (c) print; (d) input.*

7. New elements can be added to an existing list using *(a) append; (b) in; (c) range; (d) update.*

8. A `for` loop can be thought of as *(a) a finite while loop; (b) an infinite while loop; (c) a while loop over an index; (d) completely unrelated to the while loop.*

II. [**30 marks**] What is the output of the following code fragments?

1.
```
if not True or not (True and False):
    print( 'Choice 1' )
else:
    print( 'Choice 2' )
```

2.
```
newlist=['SEE1002','see1002','See1002', "SEE'1002"]
for i in range(3,-1,-1):
    print( newlist[i] )
```

3.
```
def square(x):
    x=x*x
    print(x)
    return(x)

x=2
square(x)
print(x)
```

4.
```
x=3.1415
y=2.714
z=1
print('x={:.3f}, y={:.2f}, z={:.1f} '.format(y,x,z))
```

5.
```
mylist = ['Shirokuma', 'Tokage', 'Tonkatsu']
for i,x in enumerate(mylist):
    print( x[-i] )
```

6.
```
a = '1'
b = '2'
c = 3
d = 4
e = " "
print(a+b,end="")
print(c+d)
```

7.
```
constants={}
constants.update({'g':9.8})
constants.update({'R':6e6})
constants.update({'r':6000})
constants.update({'gamma':8.0})
print(constants['r'] + constants['gamma'])
constants['g'] = 9.81
print('The sum is {:.2f}'.format(constants['g'] + constants['
   gamma']))
```

8.
```
guess = 3
answer=1
count = 0
while answer != guess :
    if guess > answer:
        guess -= 1
        count += 1
    else:
        guess += 1
        count += 1
print( 'After {:d} guesses, the best guess = {:.1f}'.format(
   count,guess) )
```

9.
```
for k in range (3):
    if k==1:
        break
    for j in range (3):
        if j==1:
            continue
        for i in range(3):
            if i==1:
                continue
            else:
                print (k,j,i)
```

10.
```
temperature = 38.0
n=0
while temperature > 35:
    temperature -= 1.5
    n+=1
    print( "Number:",n,"current temperature:",temperature)
```

III. [**16 marks**] Identify and fix the errors in the following code fragments.

1. (8 marks) The following program is supposed to do the following:

   (a) Prompts the use to specify the number of integers. Once a positive integer is input, print it to the screen.

   (b) Prompts the user to enter the integers and prints them to screen.

   (c) Calculates the largest integer and prints it to the screen.

```
1  # 1. get number of points
2  N=1
3  while N<=0:
4      N=input('Please enter the number of points: ')
5
6
7  # 2. get integers
8  listi = 0
9  for i in range(N):
10     listi.update(int(input('Please enter an integer: ')))
11
12 print('Here is the set of numbers' listi)
13 print()
14
15
16 #3. find the largest number
17 maxi=1e99
18 i=0
19 for x in enumerate(listi):
20     if x > maxi:
21         x = maxi
22
23 print('The maximum number is {:d}' format(maxi))
```

The corrected program should yield the sample output shown below. User input is highlighted.

Please enter the number of points: **3**
Please enter an integer: **1**
Please enter an integer: **2**
Please enter an integer: **3**
Here is the set of numbers [1, 2, 3]
The maximum number is 3

2. (8 marks) The following program is supposed to print a multiplication table for the integers from 1 to a specified number $N$. In particular, the program:

   (a) Prompts the user to enter a positive maximum number.

   (b) Prints a table of $N$ rows and $N$ columns. The entry for row $i$ and column $j$ should correspond to $i * j$. The columns should be aligned; assume that $N < 50$.

```
1 N=0
2 while N<0:
3     int(input('Enter max number: '))
4
5 for j in range(N):
6     print('{:.2f} '.format(i*j))
7
8     for i in range(N):
9         print()
```

The corrected program should yield the sample output shown below. User input is highlighted.

Enter max number: **4**

```
 1   2   3   4
 2   4   6   8
 3   6   9  12
 4   8  12  16
```

IV. [**20 marks**]
Write a program that analyses a string input by a user. The program should do the following:

1. Prompt the user to enter a string. Quit the program if the user enters 'q' or 'Q'.
2. Count the number of characters and spaces
3. Print the string along with the number of characters and spaces.
4. Repeat steps 1-3.
5. If the user selects 'q' or 'Q', print a message with number of characters, average length and average number of spaces (to one decimal place).

Sample output is shown below. User input is highlighted.

Enter a string (type q or Q to quit): **He feels happy and relaxed everyday.**
You entered: He feels happy and relaxed everyday.
The string has 36 characters and 5 spaces

Enter a string (type q or Q to quit): **Quiet!**
You entered: Quiet!

The string has 6 characters and 0 spaces

Enter a string (type q or Q to quit): **The quick brown fox has socks.**
You entered: The quick brown fox has socks.
The string has 30 characters and 5 spaces

Enter a string (type q or Q to quit): **Q**
You entered 3 strings.
Average number of characters = 24.0 and average number of spaces = 3.3