Information and Computer Science Department
ICS 104: Introduction to Programming in Python and C
Final Exam, Term 211
Thursday, December 30, 2021
Duration: 120 minutes

Code 001   Code 001

Name: _____   ID: _____

Instructor and Section: Select one

Instructor	Section	
Mr. Mustafa AlTurki	[ ] **01** (UT 9 – 9:50)	[ ] **10** (UT 11 – 11:50)
Dr. Husni Al-Muhtaseb	[ ] 0**2** (UT 10 – 10:50)	[ ] 09 (UT 9 – 9:50)
Dr. Mohammed Amro	[ ] **03** (MW 10 – 10:50)	[ ] **04** (MW 11 – 11:50)
Dr. Samer Arafat	[ ] **5** (UT 13 – 13:50)	[ ] **6** (UT 14 – 14:50)
Dr. Mohamed Balah	[ ] **7** (MW 8 – 8:50)	[ ] **8** (MW 9 – 9:50)

Instructions:
1. Answer all questions. Make sure your answers are **clear** and **readable**.
2. The exam is closed book and closed notes. No calculators or any helping aides are allowed. Make sure to turn off your mobile phone and keep it in your pocket.
3. If there is no space on the front of the page, use the back of the page. Indicate this clearly.

Question	Maximum Points	Earned Points	Remarks
MCQ	60		
Output	20		
Program	20		
Total	100		

Part_1 : MCQ questions [40 x 1.5 = 60 points]: (Make sure to bubble the correct answer in the green sheet)

1) Which one of the following code segments will result in an error?

a)	```a = [1,2,3]``` ```a[1]=5```
b)	```a = [1,2,3]``` ```print(a[0])```
c)	```a = (1,2,3)``` ```a[1]=5```
d)	```a = {"k1":3,"k2":4}``` ```a["k3"]=5```
e)	None of the above

For questions 2-3 consider the following class:

```
class Ticket:
    def __init__(self, movie, seat, time):
        self._movie = movie
        self._seat = seat
        self._time = time

    def change_time(self, newTime):
        self._time = newTime

    def change_seat(self, newSeat):
        self._seat = newSeat

    def printTicket(self):
        print(self._movie, self._seat, self._time)
```

2) What will be the output of the following code fragment?

```
ticket1 = Ticket("Apple Documentary", "2B", "5:00pm")
ticket2 = Ticket("Google Documentary", "4C", "5:00pm")
ticket1.change_time("7:30pm")
ticket2.change_seat("5A")
ticket1.printTicket()
ticket2.printTicket()
```

a)	```Apple Documentary 2B 7:30pm``` ```Google Documentary 5A 5:00pm```
b)	```Apple Documentary 2B 5:00pm``` ```Google Documentary 4C 5:00pm```
c)	```Apple Documentary 4C 7:30pm``` ```Google Documentary 4C 7:30pm```
d)	```Apple Documentary 2B 5:00pm``` ```Google Documentary 2B 5:00pm```
e)	```Apple Documentary 2B 5:00pm``` ```Google Documentary 5A 5:00pm```

3) Which of the following methods is known as constructor?

a)	`change_time`
b)	`change_seat`
c)	`__init__`
d)	`printTicket`
e)	`None of the above`

4) Which of the following code segments add a new key, value pair to a dictionary named **d**?

a)	`d{"c":7}`
b)	`d.add("c", 7)`
c)	`d.append("c", 7)`
d)	`d{"c"}=7`
e)	`d["c"]=7`

5) What will be the output of the following code fragment?

```
def modify(myList):
    for i in range(len(myList)):
        myList[i] = myList[i] + 1
a = [1,2,3]
modify(a)
print(a)
```

a)	`[2, 3, 4]`
b)	`[1, 2, 3]`
c)	`[2, 4, 6]`
d)	`[1, 1, 1]`
e)	`[1, 2, 3, 1]`

6) What will be the output of the following code fragment?

```
a = [1, 2, 3, 10, 5, 8, 9]
i = len(a)//2
while i >=0:
    if a[i] % 2 == 1:
        print(a[i], end=" ")
    i = i - 1
```

a)	1 3 5 9
b)	9 5 3 1
c)	3 1
d)	1 3
e)	5 3 1

7) Assume the variable **names** is a list of strings, which of the following is the correct way to transform the strings in that list to upper case?

a)	`for n in names:` `    n = n.upper()`
b)	`for n in names:` `    n.upper()`
c)	`for i in range(len(names)):` `    i = i.upper()`
d)	`for i in range(len(names)):` `    names[i].upper()`
e)	`for i in range(len(names)):` `    names[i] = names[i].upper()`

8) Which of the following is the correct way to handle the exception raised by opening a file for reading that does not exist?

a)	`f = open("hello.txt", "r")`
	`if f == IOError:`
	`    print("Error")`

b)	`f = open("hello.txt", "r")`
	`except IOError:`
	`    print("Error")`

c)	`try:`
	`    f = open("hello.txt", "r")`
	`except IOError:`
	`    print("Error")`

d)	`try open("hello.txt", "r")` `except IOError`

e)	`except IOError:`
	`    print("Error")`
	`try:`
	`    f = open("hello.txt", "r")`

9) In Python, what will happen if you open a file for writing that does not exist?

a)	The program will not be executed.
b)	The file will be created when you run the code.
c)	An exception will be raised.
d)	The program will open the file for reading instead.
e)	None of the above

10) Assume no exception is raised when you run the following Python code fragment, what is its output?

```
try:
    f = open("output.txt", "w")
except IOError:
    print("Something went wrong")
finally:
    print("cleaning up")
```

a)	Something went wrong Cleaning up
b)	cleaning up
c)	Something went wrong
d)	NO OUTPUT
e)	None of the above

11) What will be the output of the following code fragment?

```python
def fun(list1, list2):
    list3 = []
    for i in range(len(list1)):
        list3.append(list1[i] + list2[i])
    return list3
a = fun([1,2,3], [4,5,6])
print(a)
```

a)	[1, 2, 3, 4, 5, 6]
b)	21
c)	[1, 2, 3]
d)	[5, 7, 9]
e)	[4, 5, 6]

12) Which of the following statement is true in Python?

a)	Multiple objects can be created from one class.
b)	A dictionary can have two items with the same key but different values.
c)	Each function must have a return statement.
d)	The code under "finally" clause will be executed only when an exception is raised in the code of the try clause.
e)	All the above are true statement.

13) What will be the output of the following code fragment?

```python
d = {"ICS104": 3, "COE202":4, "ICS108": 3, "ICS202": 3}
for k in d:
    if "ICS" in k:
        d[k] = d[k] + 1
print(d)
```

a)	{'ICS104': 4, 'COE202': 5, 'ICS108': 4, 'ICS202': 4}
b)	{'ICS104': 4, 'COE202': 4, 'ICS108': 4, 'ICS202': 4}
c)	{'ICS104': 3, 'COE202': 5, 'ICS108': 3, 'ICS202': 3}
d)	{'ICS104': 1, 'COE202': 1, 'ICS108': 1, 'ICS202': 1}
e)	{'ICS104': 4, 'ICS108': 4, 'ICS202': 4}

14) What will be the output of the following code fragment?

```python
myList = ['a', 'b', 'c', 'd']
myList.pop()
el = myList.pop(1)
myList.append(el)
print(myList)
```

a)	['a', 'b', 'c', 'd']
b)	['a', 'c', 'el']
c)	['b', 'c']
d)	['a', 'c', 'b']
e)	This code will generate an error

15) What will be the output of the following code fragment?

```python
def f1():
    a = 5
def main():
    a = 4
    print(a, end=" ")
    f1()
    print(a)
main()
```

a)	4 5
b)	4 4
c)	5 5
d)	5 4
e)	None of the answers is correct

16) What will be the output of the following code fragment?

```python
d = {"A": 1, "B": 2}
d["C"] = d["C"] + 1
print(d)
```

a)	{"A": 1, "B": 2}
b)	{"A": 1, "B": 2, "C": 1}
c)	{"C": 1}
d)	{"A": 2, "B": 3, "C": 1}
e)	This code will generate an error

17) Consider the following code fragment:

```
x = [2, 3, 5, 7]
y = x
z = list(y)
```

Given the following statements:
1. x and y are references to the same list.
2. z and y are references to two independent lists.
3. z and x are references to two independent lists.
4. A total of two lists are created by the above program.

Choose the most suitable answer:

a)	Only statement 1 is True.
b)	Only statement 2 is True.
c)	Only statement 3 is True.
d)	Only statement 4 is True.
e)	All four statements are true.

18) What will be the output of the following code fragment?

```
s = [1, 1, 1]
for i in range(3):
    s[3] = s[i] * 2
print(s)
```

a)	[1, 1, 1]
b)	[2, 2, 2]
c)	[1, 2, 1]
d)	[1, 1, 1, 1, 1, 1]
e)	This code will generate an error

19) What will be the output of the following code fragment?

```
a = [2, 2, 2]
b = [1, 1, 1]
c = a+b
print(c)
```

a)	This code will generate an error
b)	[3, 3, 3]
c)	[1, 1, 1, 2, 2, 2]
d)	[3, 3, 3, 3, 3, 3]
e)	[2, 2, 2, 1, 1, 1]

20) What will be the output of the following code fragment?

```python
grades = {"Ahmed": 3, "Ali": 6, "Khalid": 7, "Rami": 1}
for student in grades:
    if grades[student] > 5:
        print(student, end=" ")
```

a)	Ali Khalid
b)	Ahmed Ali Khalid Rami
c)	{"Ali": 6, "Khalid": 7}
d)	6 7
e)	{"Ahmed": 3, "Ali": 6, "Khalid": 7, "Rami": 1}

21) What will be the output of the following code fragment if the file f.txt does not exist?

```python
try:
    print("Start", end =" ")
    f = open("f.txt", "r")
    print("Opened", end =" ")
except IOError:
    print("Error")
```

a)	Opened Error
b)	Start Opened Error
c)	Error
d)	Start
e)	Start Error

22) What will be the output of the following code fragment?

```python
class Member:
    def __init__(self, name, points=0):
        self._name = name
        self._points = points

    def addPoints(self, newPoints):
        self._points = self._points + newPoints

    def display(self):
        print(self._name, self._points)
m1 = Member("Ali")
m2 = Member("Ahmed", 34)
m1.addPoints(4)
m2.addPoints(2)
m1.display()
m2.display()
```

a)	Ali 4 Ahmed 2

b)	Ali 4 Ahmed 36
c)	Ali 4 Ahmed 40
d)	Ali 0 Ahmed 34
e)	None of the other answers is correct.

23) The following Python code fragment is supposed to print out the string **s** in reverse order
'edcba'..

```
s = 'abcde'
t = ''
for ch in s:
    t = XXX
print(t)
```

What goes in the place marked XXX?

a)	s
b)	t + ch
c)	ch
d)	ch + t
e)	s + ch

24) Given the following function definition which returns two values

```
def func():
    x = 1
    y = 2
    return (x, y)
```

which of the following code fragments calls the function and prints the second returned value?

a)	print(y) (x, y) = func()
b)	y=func() print(y)
c)	func(x,y) print(y)
d)	(y,x) = func() print(x)
e)	There is no correct answer.

25) Which of the following is the correct way of calling the constructor of the class **Account** to create an object, assume the constructor takes no arguments?

a)	obj = Account. constructor()
b)	obj = Account. __init__()
c)	obj = Account()

d)	obj = Account. __init__(self)
e)	obj = Account(self)

26) What will be the content of the file **output.txt** after running this code?

```
content = ["Intro","to","programming"]
f = open('output.txt', 'w')
for w in content:
    f.write(w)

f.close()
```

a)	Introtoprogramming
b)	Intro to programming
c)	Intro to programming
d)	www
e)	None of the other answers is correct.

27) What will be the output of the following code fragment?

```
x = [1, 2, 3]
x = x * 2
evens = []
for i in x:
    if i % 2 == 0:
        evens.append(i)
print(evens)
```

a)	2
b)	[2, 4, 6]
c)	[2]
d)	[2, 2]
e)	This code will generate an error.

28) Which of the following prints the indexes of the negative numbers in the list **x**?
For example if **x=[-4, 12, 5, -2]**, the program will print 0   3

a)	```for i in range(x): if i<0: print(i, end=" ")```
b)	```for i in range(len(x)): if i<0: print(i, end=" ")```
c)	```for i in x: if i < 0: print(i, end=" ")```

d)	```for i in range(len(x)):
	    if x[i] < 0:
	        print(i, end=" ")```

e)	None of the above

29) Using the following variables

```
names = "Adam Ali Basel Badr"
scores = "12 3 12 4"
namesList = names.split( )
scoresList = scores.split( )
```

which of the following code segments will result in creating the following dictionary?

```
d = {'Adam': '12', 'Ali': '3', 'Basel': '12', 'Badr': '4'}
```

a)	```d = {}
	for i in namesList:
	    d[namesList[i]] = scoresList[i]```

b)	```d = {}
	for i in range(namesList):
	    d[namesList[i]] = scoresList[i]```

c)	```d = dict(names, scores)```

d)	```d = {}
	for i in range(len(namesList)):
	    d[namesList[i]] = scoresList[i]```

e)	```for i in range(len(namesList)):
	    d = {}
	    d[namesList[i]] = scoresList[i]```

30) What will be the output of the following code fragment?

```
def changeit ( mylist ):
    mylist = [1, 2, 3, 4]
x=[4, 5, 6]
changeit(x)
print(x)
```

a)	[4, 5, 6]
b)	[1, 2, 3, 4]
c)	Error: the 2 lists must have same size
d)	[4, 5, 6, 1, 2, 3, 4]
e)	None of the other answers is correct.

31) Given a list **x** defined as :

```
x = [3, 6, 2, 1, 4, 8, 3]
```

Which of the following code fragments will print the following output?

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| a) | ```
i = len(x)
while i >= 0:
    if i % 2 == 0:
        print(i, end="")
    i = i - 1
``` |
| b) | ```
i = len(x) - 1
while i >= 0:
    if x[i] % 2 == 1:
        print(x[i], end="")
    i = i - 1
``` |
| c) | ```
i = len(x) - 1
while i >= 0:
    if i % 2 == 0:
        print(x[i], end="")
    i = i - 1
``` |
| d) | ```
i = len(x) - 1
while i >= 0:
    if x[i] % 2 == 0:
        print(x[i], end="")
        i = i - 1
``` |
| e) | ```
i = len(x) - 1
while i >= 0:
    if x[i] % 2 == 0:
        print(x[i], end="")
    i = i - 1
``` |

32) Which of the following statements is correct in Python?

a)	The user of a class needs only to know the public interface.
b)	To call a method of an object, we must write self as the first argument.
c)	lists and strings are object of the same class.
d)	Multiple objects created from the same class always have the same values for all instance variables.
e)	Instance variables cannot be changed after the object is created.

33) What will be the output of the following code fragment?

```python
list1 = [3, 5]
list2 = [4, 6]
list3 = []
for i in list1:
    list3.append(i)
    for j in list2:
        list3.append(j)
print(list3)
```

a)	[3, 4, 6, 5, 4, 6]
b)	[3, 5, 4, 6]
c)	[3, 3, 3, 5, 5, 5]
d)	[3, 4, 4, 5, 4, 4]
e)	[3, 5, 4, 6, 3, 5, 4, 6]

34) What will be printed after executing the following C code fragment:

```c
int i;
for(i = 0; i<3 ;i++)
  i++ ;
printf("%d", i);
```

  A. 3
  B. 4
  C. 5
  D. 2
  E. 6

35) What will be printed after executing the following C code fragment:

```c
int i=5 ;
i++ ;
printf("%d", i++);
```

  A. 4
  B. 5
  C. 6
  D. 7
  E. 8

36) What will be printed after executing the following C code fragment:

```c
int *i, *j, n = 3, m = -2;
i = & n ;
j = & m ;
*i = 4 ;
*j = -1 ;
printf("%d  %d", m , n) ;
```

   A. 4   -1

   B. -1 4

   C. 4   4

   D. -1 -1

   E. 3 -2

37) What will be printed after executing the following C code fragment:

```c
int k = 9  ;
if(k > 10 || k <= 99)
    printf("%d",(k - 5));
else
    printf("OUT OF RANGE");
```

   A. OUT OF RANGE

   B. 9

   C. 4

   D. 0

   E. -5

38) What will be printed after executing the following C code fragment:

```c
int i, j, m = 0;
for(i = 0; i<3 ;i++)
    for(j = 0; j<3 ;j++)
        m=m+1;
printf("%d", m);
```

   A. 4

   B. 6

   C. 16

   D. 9

   E. 12

39) Consider the following C code

```c
#include <stdio.h>
void f1(int a) { a = 5 ; }
void f2(int *b) { *b = 10 ; }
int main()  {
int i = 9 ;
f1(i) ;
f2(&i) ;
printf("%d", i) ;
return 0;}
```

Which of the following is the correct output after executing the above code?

  A. 9
  B. 5
  C. 10
  D. 0
  E. 15

40) What will be printed after executing the following C code fragment:

```c
 int x=7;
 if(x >= 5 )
    if(x > 10)
       if(x <15)
           printf("AA");
       else
           printf("CC");
    else if ( x >= 0)
       printf("DD");
    else
       printf("BB");
 else
    printf("E");
```

  A. AA
  B. BB
  C. CC
  D. DD
  E. E

Part 2: 20 points

What is the output generated by the following C or Python code fragments? Write only what appears on the screen in the output box shown on the right side.

``c
// 2 pts
int val, sum, x;
    val = 1;
    do {
        sum = 0;
        for (x = 0; x < val; x++) {
            sum = sum + x;
        }
        val = val + 1;
        printf("%d ", sum);
    } while (val < 3);
``	

``c
// 2 pts
    char c1 = 'z';
    char c2 = 'a';
    char *c3;
    c3 = &c2;
    printf("%c\n", *c3);
    c3 = &c1;
    printf("%c\n", *c3);
``	

``c
// 2 pts
#include <stdio.h>
void test2(int *a, int b);
int main(void) {
    int a = 5, b = 10;
    test2(&b, a);
    printf("%d %d\n", a, b);
    return 0;
}
void test2(int *a, int b) {
   *a = 7;
    b = 8;
}
``	

``c
// 2 pts
int acc = 0, counter = 1;
while (counter <= 3) {
    acc = acc + counter;
    counter = counter + 1;
}
printf("%d %d\n", acc,counter);
``	

```python
# 1.5 pts
depts = ["ICS", "COE", "ISE", "CHEM", "PE"]
depts.pop(0)
depts.pop(1)
print(depts)
```

```python
# 1.5 pts
words = {2: "halo", 3: "hom", 1: "chico"}
for key in sorted(words) :
    print("%s  " % (words[key]))
```

```python
# 2 pts
for cnt1 in range(2) :
    for cnt2 in range(1, 3) :
        print(cnt1 + cnt2, end=" ")
    print()
```

```python
# 1 pt
for indx in range(50, 70, 10) :
   print(indx)
```

```python
# 2 pts
str1 = "Jeddah, Riyad, and Dhahran"
print("ah" in str1)
print(str1.count("ah"))
```

```python
# 2 pts
a=0
b=3
while a != 5 and b != 5:
    a = b
    b = b + 1
print(" a = " , a, "  b = " , b)
```

```python
# 2 pts
def f(i, j=2):
    return i+j
print (f(f(4,3),4))
print(f(5))
```

Part 3: Programming Question [20 points]

In mathematics, the dot product is the sum of the products of the corresponding entries of the two equal-length sequences of numbers. The formula to calculate dot product of two sequences of numbers a =[a_0, a_1, a_2, …, a_{n-1}] and b =[b_0, b_1, b_2, …, b_{n-1}] is defined as:

$$dot\ product = \sum_{i=0}^{n-1} a_i \times b_i$$

For example if a = [3.4 ,-5.2 , 6] and b = [2.5, 1.6, -2.9]
Dot product = 3.4 x 2.5 + (-5.2) x 1.6 + 6 x (-2.9) = -17.22

Write a python program that calculates the dot product. The program should have the following user-defined functions.

main(): function asks the user for file names that contain the two sequences of real values. The function call readInput and dotProduct to read data from files and calculates the dot product

readInput(filename): This function receives filename and reads the sequences of real values from the file, stores them in a list. Then, the function returns the list.

dotProduct(list1, list2): This function receives two lists of real values with same length. It computes and returns their dot product. **You are not allowed to print the dot product from this function.**

<u>Note</u>:

- Make sure that your indentation is clear, otherwise you may lose points.
- Your functions must be general and not specific to the given example.
- **It is not allowed to use global variables and any external library to calculate the dot product.**
- Handle all exceptions when dealing with files.

The following are sample runs of the program:

Sample run#1
```
Enter first file name : input1.txt
Enter second file name: input3.txt
The two sequences numbers are not equal in length.
```

Sample run#2
```
Enter first file name : input4.txt
Error: the input file: input4.txt is not found
```

Sample run#3
```
Enter first file name : input1.txt
Enter second file name: input2.txt
Dot product = -17.22
```

Sample run#4
```
Enter first file name : input1.txt
Enter second file name: input4.txt
Error: the input file: input4.txt is not found
```

Sample c**ontent of the input files:**

input1.txt
3.4
-5.2
6

input2.txt
2.5
1.6
-2.9

input3.txt
-1.5
1.8

input4.txt file does not exist