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) [ ] 0**9** (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?

```
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?

```
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?

```
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?

```
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?

```
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?

```
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?

```
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?

```
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?

```
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:

```
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:

```
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:

```
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:

```
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:

```
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

```
#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:

```
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.

// 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);`
	0 1
	
	1 pt each value

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

// 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;`
`}`
	5 7
	
	1 pt each value

// 2 pts
`int acc = 0, counter = 1;`
`while (counter <= 3) {`
`acc = acc + counter;`
`counter = counter + 1;`
`}`
`printf("%d %d\n", acc,counter);`
	6 4
	
	1 pt each value

# 1.5 pts depts = ["ICS", "COE", "ISE", "CHEM", "PE"] depts.pop(0) depts.pop(1) print(depts)	['COE', 'CHEM', 'PE'] 0.5 pt each value Order must match
# 1.5 pts words = {2: "halo", 3: "hom", 1: "chico"} for key in sorted(words) : print("%s " % (words[key]))	chico halo hom 0.5 pt each value Order must match

# 2 pts 	
for cnt1 in range(2) :
  for cnt2 in range(1, 3) :
  print(cnt1 + cnt2, end=" ")
  print()
	1 2
	2 3
	
	0.5 pt each value
	Order must match

# 1 pt for indx in range(50, 70, 10) : print(indx)	**50** **60** 0.5 pt each value Order must match
# 2 pts str1 = "Jeddah, Riyad, and Dhahran" print("ah" in str1) print(str1.count("ah"))	**True** **2** **1 pt each value**

# 2 pts 	
a=0
b=3
while a != 5 and b != 5:
  a = b
  b = b + 1
print(" a = " , a, " b = " , b)
	a=4 b=5
	
	1 pt each value

# 2 pts def f(i, j=2): return i+j print (f(f(4,3),4)) print(f(5))	**11** **7** **1 pt each value**

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 $a = [a_0, a_1, a_2, \ldots, a_{n-1}]$ and $b = [b_0, b_1, b_2, \ldots, b_{n-1}]$ 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.**

Note:

- 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.

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

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
```

```
def main(): #7 points
    ### main function the entry point of the program ###
    filename = input("Enter first file name : ") # 0.5 point
    vector1= readInput(filename) # 0.5 point
    if len (vector1) != 0: #0.5
        filename = input("Enter second file name: ") #0.5 point
        vector2= readInput(filename)     #0.5 point
        if len (vector2) != 0: #0.5
            if len (vector1) == len (vector2): # 1 point (if with else)
                result = dotProduct(vector1, vector2) #2 point
                print("Dot product = %0.2f"% result) #0.5 point
            else:
                print("The two sequences are not equal in length.") #0.5 point


def dotProduct(list1, list2): # 5 points
    ### function that return dot product of two vectors of real values. ###
    sum = 0; # 0.5 point
    for i in range(len(list1)): # 2 points
          sum= sum + list1[i]*list2[i]  # 1.5 points
    return sum # 1 point

def readInput(filename): #8 points
    ### function that read real values from file and return it as list . ###
    try : #2 points for try-except (0.5-try  0.5 except  1 print)
        vector= [] # 1 point
        infile = open(filename,'r') # 1 point

        for line in infile: # 1.5 points
            vector.append(float(line)) # 1 points

        infile.close() # 0.5 point
    except IOError:
        print("Error: the input file: "+filename+" is not found")
    return vector # [1 point ]
```