ICS4U Final Exam

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Knowledge/Understanding

1. Given the following code segment:

```
a = 0, b = 0
while (a < 10) :
        b += a
print (b)
```

Which output will be displayed?
a) 0
b) 10
c) 18
d) an infinite loop will occur

```
d
```

2. Given the following code segment:

```
for i in range (0,10):
        for j in range (0, 3):
        print (‘#’)
```

How many number signs will be displayed when the code segment is run?
a) 3
b) 4
c) 30
d) 300

```
c
```

3. Suppose s1 = {1, 2, 4, 3} and s2 = {1, 5, 4, 13}, what is s1 | s2 ?
   a) {1, 2, 4, 3, 1, 5, 4, 13}
   b) {1, 2, 4, 3, 5, 13}

c) {1, 2, 4, 3}
d) {1, 5, 4, 13}

```
b
```

4. Suppose x = 1, y = -1, and z = 1. What will be displayed by the following statement?

```
if x > 0:
        if y> 0:
                print(“x > 0 and y > 0”)
elif z>0:
        print (“x < 0 and z > 0 ”)
```

a) x > 0 and y > 0
b) x < 0 and z > 0
c) x < 0 and z < 0
d) nothing displayed

```
d
```

5. Analyze the following code:

```
class A:
        def __init__ (self,s) :
                self.s = s
        def print(self):
                print (self.s)
a = A()
a.print( )
```

a) The program has an error because class A does not have a constructor.
b) The program has an error because s is not defines in print(s).
c) The program runs fine and prints nothing.
d) The program has an error because the constructor is invoked without an argument.

```
d
```

6. Analyze the following code:

```
class A:
        def __init__(self):
                self.x =1 self.__y = 1
        def getY(self):
                return self.__y

a = A()
a.x = 45
print(a.x)
```

a) The program has an error because x is private and cannot be accessed outside of the class.
b) The program has an error because y is private and cannot be access outside of the class.
c) The program runs fine and prints 1.
d) The program runs fine and prints 45.

```
d
```

7. What is the value of times displayed?

```
def main():
        myCount – Count()
        times = 0

for i in range(0, 100):
        increment(myCount, times)

print(“myCount.count =”’ myCount.count, “times =”, times)

def increment(c, times)
        c.count += 1
        times += 1

class Count:
        def __init__(self):
                self.count = 0

main()
```

a) count is 101 times is 0
b) count is 100 times is 0
c) count is 100 times is 100
d) count is 101 times is 101

```
b
```

8. What will be displayed by the following code?

```
class A:
        def __str__(self):
                return “A”

class B(A):
        def __init__(self):
                super().__init__()

class C(B):
        def __init__(self):
                super().__init__() def main():


b = B( )
a = A( )
c = C( )

print(a, b, c)

main()
```

a) C C C
b) A B C
c) A A A
d) B B B

```
b
```

9. To check whether an object o is an instance of class A, use:
   a) o.isinstance(A)
   b) A.isinstance(o)
   c) isinstance(o, A)
   d) isinstance(A, o)

   ```
   c
   ```

10. What will be displayed by the following code?

```
class Person:
        def getInfo(self):
                return “Person’s getInfo is called”

        def printPerson(self):
                print(self.getInfo(), end = ‘ ‘)

class Student(Person):
        def getInfo(self):
                return “Student’s getInfo is called”
```

```
def main():
        Person().printPerson()
        Student().printPerson()

main()
```

a) Person’s getInfo is called Person’s getInfo is called
b) Person’s getInfo is called Student’s getInfo is called
c) Student’s getInfo is called Person’s getInfo is called
d) Student’s getInfo is called Student’s getInfo is called

```
b
```

11. What is displayed when the following program is run?

```
try:
list = 10* [0]
x = list [9]
print (“Done”) except IndexError:
print (“Index out of bound”) else:
print(“Nothing is wrong”) finally:
print (“Finally we are here”)
```

a) “Done” followed by “Nothing is wrong”
b) “Done” followed by “Nothing is wrong” followed by “Finally we are here”
c) “Index out of bound” followed by “Nothing is wrong” followed by “Finally we are here”
d) “Nothing is wrong” followed by “Finally we are here”

```
b
```

12. To read two characters from a file object infile, use:
    a) infile.read(2)
    b) infile.read()
    c) infile.readline()
    d) infile.readlines()

```
a
```

13. The readlines() method returns a:
    a) str
    b) a list of lines
    c) a list of single characters
    d) a list of integers

```
b
```

14. The time to merge two sorted lists of size n is:
    a) O (1)
    b) O (log n) c) O (n)
    d) O (n log n) e) O(n * n)

```
d
```

15. The worst-time complexity for quick sort is
    a) O (1)
    b) O (log n) c) O (n)
    d) O (n log n) e) O (n * n)

```
e
```

Thinking

16. Using class, write a program of Points and Circles

- A point in the plane is represented by the values for its coordinates, usually called x and y.
- The class Point has attributes x and y and a string representation which will return the string representation of the point.
- A circle is determined by a center and radius.
- The class Circle will inherit from the class Point to represent its center. The radius of
  the circle is an additional object data attribute. The function area is an additional functional attribute.
- The class Circle will use the string representation of Point for its center and extend
  the **str()** function for its radius.
- (Polymorphism) Calling str() on x gives different strings, depending on whether x is
  an instance of the class Point or Circle. Display the coordinates of point and center,
  radius and area of circle.
- Derive a class Cylinder from the class Circle and print the area and volume of a cylinder.
- Write comments for your codes.
- Give examples of outputs that you will get.

```
import math
```

```python
class Point:
    def __init__(self, x, y) -> None:
        self.x = x
        self.y = y

    def __str__(self) -> str:
        return f"Center: ({self.x}, {self.y})"


class Circle(Point):
    def __init__(self, radius, x, y) -> None:
        super().__init__(x, y)
        self.radius = radius
        self.area = self.circle_area()

    def circle_area(self):
        return math.pi * self.radius * self.radius

    def __str__(self) -> str:
        return f"{super().__str__()}, Radius: {self.radius}"


class Cylinder(Circle):
    def __init__(self, height, radius, x, y) -> None:
        super().__init__(radius, x, y)
        self.height = height

    def surface_area(self):
        return 2 * math.pi * self.radius * self.height + 2 * math.pi *
self.radius * self.radius

    def volume(self):
        return self.circle_area() * self.height

    def __str__(self) -> str:
        return f"{super().__str__()}, Surface Area: {self.surface_area()},
Volume: {self.volume()}"


c = Circle(10, 5, 10)
print(c.circle_area())
print(c.__str__())

cy = Cylinder(100, 50, 10, 50)
print(cy.surface_area())
print(cy.volume())
print(cy.__str__())
```

Output

```
Center: (5, 10), Radius: 10
47123.8898038469
785398.1633974483
Center: (10, 50), Radius: 50, Surface Area: 47123.8898038469, Volume: 
785398.1633974483
```

Communication

17. Computer Technology has now allowed employees to work from home. (8 marks)
    a) Give two advantages to employers of allowing employees to work from home.

- No need to rent large offices and less office maintainence costs.
- Better productivity since less interactions with co-workers and less time to commute to work.

a) Give two advantages to the employees of working from home.

- Save Money for transportation to and from work.
- More freedom is granted to them.

b) Describe in details, two advances in computer technology which have allowed working from home to become possible.

- Better video conferencing infrastricture offering low latence and high quality video and audio.
- Better team management software and communication systems imporves workflow.

18. a) State three ways of preventing hackers from committing computer crimes. (7 marks)
    For hackers to stop committing computer crimes, we should gove them another option.

- By having bettwe paying careers for penetration testing and CyberSecurity so that thet would become white hats instead of being a black hat and committing crimes.
- We should also tighten our computer system's security with safety protocols and industry standards and best practices.
- Train employees to be more skilled at administering networks and systems or train/employ more white hat hackers so that they will help upgrade system and discover flaws and patch them.

b) Describe how fingerprints systems can be used to help catch criminals.
Fingerprint systems are very important and used widely in modern crime solving. Finrgerprints can be excuted from a crime scene and then be inputed into a database

of fingerprints with the person's name included. If the fingerprint matchees, then the person can be arrested. If the fingerprint is not in the database, they can collect fingerprints from the suspects and match them with the one from the crime scene.

Application

19. Write a Python program that declares a string and returns key-value pairs of the letters in alphabetical order which occur in the string together with the number of times each letter occurs. Case should be ignored.
    Example: string1= ‘pineapple’
    Output- {(a:1), (e:2), (i:1), (l:1), (n:1), (p:3)}

```
def characters(string):
    """
    For each character in the string, if the character is in the
dictionary, add one to the value of that key, otherwise,
    add the character to the dictionary with a value of 1.
    """
    dictionary = dict()
    # Iterating through the string and adding the characters to the
dictionary.
    for i in string:
        keys = dictionary.keys()

        if i in keys:
            dictionary[i] += 1
        else:
            dictionary[i] = 1

    return dictionary


# Sorting the dictionary by the keys.
sorted_dict = dict(sorted(characters("William".lower()).items()))
print(sorted_dict)
```

Output

```
{'a': 1, 'i': 2, 'l': 2, 'm': 1, 'w': 1}
```

20. Write a python program to store 10 students’ names and their age. If their age is less than 16 then they are not eligible to apply for driver’s licence or else they are. Your program will print the names and age of the two different groups.

```
def store_input() -> list:
    # Creating a list of dictionaries.
```

```python
    students = list()
    # Asking the user to input a name and age 10 times.
    for i in range(10):
        name: str = input("Enter name: ")
        age: int = int(input("Enter age: "))
        students.append({"name": name, "age": age})

    return students


def check_eligibility(students: list) -> list:
    # Checking if the age is less than 16 and if it is, it is setting the
eligible key to False.
    for i in students:
        if i["age"] < 16:
            i["eligible"] = False
        else:
            i["eligible"] = True

    return students


def print_results(results: list) -> None:
    """
    It takes a list of dictionaries, and prints out the names and ages of
the people who are eligible to drive, and the names
    and ages of the people who are not eligible to vote
    """
    eligible = list()
    not_eligible = list()

    # Checking if the eligible key is True or False, and if it is True, it
is appending it to the eligible list,
    # and if it is False, it is appending it to the not_eligible list.
    for i in results:
        if i["eligible"]:
            eligible.append(i)
        else:
            not_eligible.append(i)

    # Checking if the eligible list is empty or not, and if it is not
empty, it is printing out the names and ages of
    # the people who are eligible to drive, and if the not_eligible list is
not empty, it is printing out the names
    # and ages of the people who are not eligible to drive.
    if len(eligible) != 0:
        print("Eligible")
        for i in eligible:
            print(i["name"], i["age"], end="\n\n")
    if len(not_eligible) != 0:
        print("Not Eligible")
        for i in not_eligible:
            print(i["name"], i["age"], end="\n\n")


def main():
    students = store_input()
    student_results = check_eligibility(students)
    print_results(student_results)


main()
```

Output

```
Enter name: William
Enter age: 19
Enter name: AK
Enter age: 18
Enter name: Jack
Enter age: 17
Enter name: Kyle
Enter age: 16
Enter name: Mikael
Enter age: 15
Enter name: Daphne
Enter age: 14
Enter name: Arkar
Enter age: 20
Enter name: Tayza
Enter age: 16
Enter name: Kylie
Enter age: 19
Enter name: Philip
Enter age: 21
Eligible
William 19

AK 18

Jack 17

Kyle 16

Arkar 20

Tayza 16

Kylie 19

Philip 21
```

```
Not Eligible
Mikael 15

Daphne 14
```