1. Assume \( x = [[1, 2], [3, 4, 5], [5, 6, 5, 9]] \), what are \( \text{len}(x) \) and \( \text{len}(x[0]) \)?

A. 3, 2  
B. 3, 4  
C. 1, 4  
D. 2, 3  
E. 2, 4  

**Q1 answer: a**
2. Consider the following dictionary definition in python:

```
StuDict = {105: 'Kate', 97: 'Brittany', 20: 'Alice'}
```

Which of the following statements prints 'Brittany'

A. print(StuDict)
B. print(StuDict[1])
C. print(StuDict[97])
D. print(StuDict['Brittany'])
E. All of the above

**Q2 answer: c**
3. What is the output of the following python program?

```python
print([2*[k] for k in range(3)][2][1])
```

A. 0
B. 1
C. 2
D. 3
E. IndexError: list index out of range

**Q3 answer: c**
4. How many times is the print statement executed?

```python
for i in range(10):
    for j in range(i):
        print(i * j)
```

A. 1  
B. 10  
C. 20  
D. 45  
E. 100  

**Q4 answer: d**
5. What is the output of the following python program?

```python
class Card:
    def __init__(self, value):
        self.value = value

card1 = Card(10)
card2 = Card(10)

print(card1 == card2)
```

A. True  
B. False  

Q5 answer: b
6. What is the output of the following python program?

```python
class MyClass:
    def MyFunction(self, value):
        self.value = value
        return 10/3

myObject = MyClass()
temp = myObject.MyFunction(5)
print(myObject.value)
```

A. 3  
B. 3.33333333  
C. 5  
D. NameError: name 'value' is not defined  
E. NameError: name 'temp' is not defined  

**Q6 answer: c**
7. What is the output of the following python program?

```python
def meow():
    print('Meow')

class Cat:
    def __init__(self, color):
        self.color = color
        meow()
        self.meow()

    def meow(self):
        print(self.color + ': Meowww')

cat = Cat('Black')
```

A. Meow
Meow

B. Black: Meowww
Black: Meowww

C. Meow
Black: Meowww

D. Black: Meowww
Meow

E. Error

**Q7 answer: c**
8. What is the output of the following python program?

```python
class Dog:
    def __init__(self, name):
        self.name = name
        self.tricks = []
    def add_trick(self, trick):
        self.tricks.append(trick)

d = Dog('Fido')
e = Dog('Buddy')
d.add_trick('roll over')
e.add_trick('play dead')
print(d.tricks)
```

A. 'roll over'
B. 'play dead'
C. ['roll over']
D. ['play dead']
E. ['roll over', 'play dead']

**Q8 answer: c**
9. Given the following assignment:

```python
fun = [[ 'C' , 'i' , 's' , ['"7"' , '"1"' ]] , ['S'] , ['cs17' , '177' , 'f'] , ['c' , 's' , 1 , 7 , 7 ]]
```

Which of the following code snippets will display the string "cs177"?

I. `for i in range(len(fun[3][0])):
    print(fun[3][0][i], end='' )`

II. `fun[3]`

III. `fun[2][0] + fun[0][3][0]`

IV. `fun[2][1]`

A. I
B. I and II
C. I and III
D. I, II and III
E. The statement assigning a value to variable fun will result in an error message

**Q9 answer:** c
10. Which of the following is true about the process of Object Oriented Design (OOD)?

A. OOD describes a system in terms of black boxes and interfaces
B. Client programs can use the functions as long as it understands what the function does.
C. OOD aims to define a useful set of classes for a given problem
D. OOD is an iterative process; it bounces back and forth between designing new classes and adding methods to existing classes.
E. All of the above

Q10 answer: e
11. What is the output of the following python program?

```python
def theAnswer():
    X = [4*[10] for j in range(7)]
    Y = [3*['Arthur'] for j in range(len(X)-1)]
    Z = [3*['Trillian'] for j in range(len(X)*len(Y))]
    print(len(Z))

theAnswer()
```

A. 36
B. 42
C. 504
D. 6804
E. None of the above

Q11 answer: b
12. What is the output of the following python program?

```python
def func(list):
    if(len(list) < 3):
        return False
    status = True
    for i in range(2, len(list)):
        if (list[i] != list[i-1] + list[i-2]):
            status = False
    return status

print(func([0,1,1,2,3,5,8,13]))
```

A. True  
B. False  

Q12 answer: a
13. What is the output of the following python program?

```python
values = [[3, 4, 5, 1], [22, 8, 10, 15]]

v = values[0][0]
for lst in values:
    for element in lst:
        if v > element:
            v = element

print(v)
```

A. 1  
B. 3  
C. 8  
D. 15  
E. 22

**Q13 answer:** a
14. What is the output of the following python program?

    matrix = [[1, 2, 3, 4],
              [4, 5, 6, 7],
              [8, 9, 10, 11],
              [12, 13, 14, 15]]

    for i in range(0, 4):
        print(matrix[1][i], " ", end = " ")

A. 1 2 3 4
B. 2 5 9 13
C. 1 4 8 12
D. 4 5 6 7
E. 3 6 10 14

Q14 answer: d
15. What is the output of the following python program?

```python
myList = [6, 5, 4, 3, 2, 1]
for i in range(1, 6):
    myList[i - 1] = myList[i]

for i in range(0, 6):
    print(myList[i], " ", end = " ")
```

A. 5 4 3 2 1 6
B. 5 4 3 2 1 1
C. 6 6 5 4 3 2
D. 1 6 5 4 3 2
E. 6 5 4 3 2 1

Q15 answer: b
16. What is the output of the following python program?

```python
sumValue = 0
while (sumValue < 100):
    sumValue = sumValue*2 + 10
print(sumValue)
```

A. 0  
B. 10  
C. 30  
D. 150  
E. 310  

Q16 answer: d
17. What is the output of the following python program?

```python
def main():
    hours_worked = 20
    wage = wage_calculator(hours_worked)
    print(wage)

def wage_calculator(x):
    if(x == 40):
        return x*8
    elif x < 40:
        return x*8 - x*4
    elif x > 40:
        return x*8 + x*4

main()
```

A. 80
B. 100
C. 320
D. 576
E. Error

**Q17 answer: a**
18. What is the output of the following python program?

```python
def main() :
    x = 5
    if (True) :
        x = x+1
    print(x * "Python")

main()
```

A. P 
B. Python 
C. PythonPythonPythonPythonPython 
D. PythonPythonPythonPythonPythonPython 
E. Compiler Error

**Q18 answer: d**
19. What is the output of the following python program?

```python
number = 25
isPrime = True
i = 2

while i < number and isPrime:
    if number % i == 0:
        isPrime = False
    i += 1

print("i is", i, "isPrime is", isPrime)
```

A. i is 5 isPrime is True
B. i is 5 isPrime is False
C. i is 2 isPrime is True
D. i is 6 isPrime is True
E. i is 6 isPrime is False

**Q19 answer: e**
20. Analyze the following statement:

```python
sum = 0
for d in range(0, 10, 0.1):
    sum += sum + d
```

A. The program has a syntax error because the range function cannot have three arguments.
B. The program has a syntax error because the arguments in the range must be integers.
C. The program has a syntax error with the use of `+=`
D. The program runs in an infinite loop.
E. The program runs fine.

**Q20 answer: b**
21. The following function is proposed to reverse a list. Does it do so correctly?

```python
def rev(S):
    n = len(S)
    for k in range(n):
        S[k], S[n-k-1] = S[n-k-1], S[k]
```

A. Yes

B. No

**Q21 answer:** b
22. What is the output of the following python program?

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

A. []
B. [[1, 2], [1, 2, 1, 2]]
C. [[1, 2, 1, 2, 1, 2], [1, 2, 1, 2, 1, 2]]
D. [[1, 2, 1, 2, 1, 2], [1, 2, 1, 2, 1, 2], [1, 2, 1, 2, 1, 2]]
E. [[0, 0, 0, 0, 0, 0], [1, 1, 1, 1, 1, 1], [2, 2, 2, 2, 2, 2]]

**Q22 answer: d**
23. Which of the following python program will correctly calculate the factorial of the variable x?

A. ```python
def cal(x):
    res = 1
    for i in range(x):
        res = res*(i+1)
    return res
```  

B. ```python
def cal(x):
    res = 1
    for i in range(x+1):
        res = res*i
    return res
```  

C. ```python
def cal(x):
    res = 0
    for i in range(0, x+1):
        res = res*i
    return res
```  

D. ```python
def cal(x):
    res = 0
    for i in range(1, x+1):
        res = res*i
    return res
```  

E. ```python
def cal(x):
    res = 1
    for i in range(1, x):
        res = res*i
    return res
```
Q23 answer: a
24. A nested int list is a list each of whose elements is an int or a nested int list. Examples: [1, 2, 3], [1, [], [2, 3]], and [[ ]]. Which of the following functions returns the number of ints in a nested int list?

I. 
```python
def f(x):
    if x == []:
        return 0
    elif isinstance(x, int):
        return 1
    else:
        return f(x[0]) + f(x[1:])
```

II. 
```python
def f(x):
    if isinstance(x, int):
        return 1
    n = 0
    for y in x:
        n += f(y)
    return n
```

III. 
```python
def f(x):
    if isinstance(x, int):
        return 1
    else:
        return f(x[0]) + f(x[1:])
```

A. I
B. II
C. III
D. I and II
E. I and III

Q24 answer: d
25. A binary tree can be represented by a list. An empty list is an empty tree. A list of length one is a leaf: the sole element is the root value. A list of length three is a larger tree: the first element is the root value, the second element is the left child, and the third element is the right child. For example, [1, [2], [3, [4], [5]]] is a tree whose root value is 1, whose left child is a leaf with value 2, and whose right child is a tree with root value 3, left child 4, and right child 5.

Which of the following functions returns the sum of the values of the nodes of a tree?

I.

```python
def f(x):
    if x == []:
        return 0
    elif len(x) == 1:
        return x[0]
    else:
        return x[0] + f(x[1]) + f(x[2])
```

II.

```python
def f(x):
    n = 0
    for y in x:
        if y == x[0]:
            n += y
        else:
            n += f(y)
    return n
```

III.
def f (x):
    return g(x, 0)

def g (x, n):
    if x == []:
        return n
    elif len(x) == 1:
        return n + x[0]
    else:
        return g(x[1], g(x[2], n + x[0]))

A. I
B. II
C. III
D. All three
E. None

Q25 answer: d