There are 27 True/False and multiple choice questions. Each one is worth 4 points.

Answer the questions on the bubble sheet given to you.

Remember to fill in the following bubble card fields:

- **student ID**: use the 10 digit ID number on your student ID card. **DO NOT USE YOUR SOCIAL SECURITY NUMBER! If you forget to write your student ID in the bubble card, you may get a 0.**
- **Last Name and First Name**
- **Instructor**: put your **RECITATION INSTRUCTOR’S LAST NAME** given in the table below
- **Test/Quiz**: put 01
- **Course**: 177
- **Section number**: find your recitation section in the table below and put in the bubble card the last column of the table below

<table>
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<tr>
<th>Section</th>
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<th>Time</th>
<th>Instructor</th>
<th>Bubble card section number</th>
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<td>W</td>
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<td>Goyal Rachna</td>
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<td>9:30</td>
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<td>0010</td>
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<td>R01</td>
<td>F</td>
<td>4:30</td>
<td>Fuerst, Joshua</td>
<td>0011</td>
</tr>
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</table>

- Only the answers on the bubble sheet will be counted.
- The questions will be discarded.

**Remember to fill in also the fields in the following page (please use capital letters!).**
Read all questions and answers carefully! Do not make any assumptions about the code other than those that are clearly stated.
Q1.
Anything that can be done with a for loop can instead be done with a while loop.

*A) True
B) False

Q2.
The following loop does not terminate:

```
for k in range(10):
k = k-1
print(k)
```

A) True
*B) False

Q3.
The following function is proposed to reverse a list. Does it do so correctly?

```
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
Q4.

Do the following two programs print the same set of numbers?

Program 1)

```python
i = 0
while i < 5:
    if (i%2) == 0:
        i = i+1
    print(i)
    i = i+1
```

Program 2)

```python
for i in range(5):
    if (i%2) == 0
        i = i+1
    print(i)
```

A) Yes
*B) No

Q5.

The following code was written to find the smallest number in a list of numbers:

```python
def myMin(L):
m = L[0]
for k in range(1,len(L)):
    if L[k] < m: m = L[k]
```

Is it correct?

A) Yes
*B) No
Q6.
What does the following Python code print?

```python
def f(L):
    if type(L) == int:
        return(L)
    s = 0
    for k in range(len(L)):
        s = s + f(L[k])
    return s
print(f([[1,2],4]))
```

A) 3
B) 6
C) 5
*D) 7

Q7.
The following code prints None.

```python
print('abracadabra'.rfind("ar"))
```

A) True
*B) False
Q8.

What is the value of L after executing the following code:

```python
L = [1,2,4]
L.insert(5,2)
```

A)  [1,2,5,4]
B)  [1,5,2,4]
C)  [1,2,4,2]
D)  [1,2,5]

Q9.

What is the value of L after executing the following statement?

```python
L = [3*[1,1,1]]
```

A)  [[1,1,1,1,1,1,1,1,1]]
B)  [[1,1,1],[1,1,1],[1,1,1]]
C)  [3,3,3]
D)  [[3,3,3], [3,3,3], [3,3,3]]
Q10.
What is the value of L after executing the following code?

\[
L = [1,2,3,4,5] \\
L.remove(3)
\]

A) [1,2,3,5]
*B) [1,2,4,5]
C) [4,5]
D) [1,2]

Q11.
What is printed by the following code?

\[
\text{print([2*[k] for k in range(3)][2][1])}
\]

A) 0
B) 1
*C) 2
D) 3
Q12.
What is the value of L after the following statement:

    L = “abra cad abra”.split(' ')

A) ['abra','cad', '']
B) ['abra','cad']
C) ['abra','cad', 'abra']
D) ['abra','cad', '', 'abra']

Q13.
What does the following print?

    if ‘False’: print(1)
    if False: print(2)
        if eval('False'): print(3)

A) 1
B) 1, then 2
C) 2
D) 2, then 3
Q14. What does the following code print?

```python
a = [1,2,3,4]
b = a
a[1] = 5
print(b)
```

A) [5,2,3,4]  
B) [1,2,3,4]  
*C) [1,5,3,4]  
D) [5,1,2,3]

Q15. Are the following two statements equivalent?

```python
[1,2,3]+[[4]]
```

and

```python
[1,2,3].append([4])
```

*A) Yes  
B) No
Q16.

Let $T = [1, [2, 3], [4, [5, 6]]]$ be a tree encoding, as discussed in class. Consider the interior nodes of the tree. What is the largest number of direct descendants of any node in the tree?

A) 4  
B) 3  
*C) 2  
D) 1

Q17.

Let $T = [1, [2, 3], [4, [5, 6]]]$ be a tree encoding, as discussed in class. How many leaves are in the tree?

A) 1  
*B) 2  
C) 3  
D) 4
Q18.
Assume F is a file object. What is the difference between X and Y where

\[ X = F.readlines() \]

and

\[ Y = F.readline() \]

A) no difference, X is always equal to Y
B) X ends with ‘\n’, but Y does not
C) X ends with ‘\t’, but Y does not
D) Y is a substring of X
Q19.
Do the following two programs print the same string?

Program1)

```python
F = open("myFile.txt",'r')
L = []
t = F.readline()
while t != '':
    L.append(t)
    t = F.readline()
F.close()
print(L[0],'done')
```

Program 2)

```python
F = open("myFile.txt",'r')
t = F.read()
L = t.split('\\n')
F.close()
print(L[0],'done')
```

A) Yes
*B) No

Q20.
What is printed by `print("hi y'all"[:])`?

*A) hi y'all

*B) "" (that is, the empty string)

C) hi y

D all
Q21.

The file Students.txt contains the following lines:

    Jim 75
    Alice 95
    Alex 75

What will the following code print?

```python
data = open("students.txt","r")
for line in data.readline():
    print(line)
```

A) The code will cause an error
B) Jim 75
C) Jim 75
   Alice 95
   Alex 75
* D) Jim 75
   Alice 95
   Alex 75
   
   7
   5
Q22.

Which is the output of the following code?

```python
A = [[1,2,3,4,5],[1,2,1,1,3],[2,1,3,5,1],[3,4,5,3,1]]

s = 0
for i in range(len(A[0])):
    for j in range (len(A)):
        s = s + A[j][i]
    print (s)
s = 0
```

A)  
15  
8  
12  
16  

*B)  
7  
9  
12  
13  
10  

C)  
1  
2  
3  
3  

D)  
5  
4  
3  
2  
1
Q23.
What is the output of the following code?
```python
myString="It's a sunny day today!"
print(myString.split("day"))
```

A) ['"It's a sunny", ', to', '!'']
B) ['"It's a sunny", 'to', '!'']
C) ['"It's a sunny", ', to', '!'']
D) ['"It's a sunny", 'to', '!'']

Q24.
What are the values of a, b and c after running the following code?
```python
a="Hello World!"
b=a.lower()
c=b.find("world")
```

A) a="hello world!", b="hello world!", c=6
B) a="Hello World!", b="hello world!", c=5
* C) a="Hello World!", b="hello world!", c=6
D) a="hello world!", b="hello world!", c=5
Q25.

Given the following matrix encoded column by column:

\[
M = \begin{bmatrix}
14, 2, 98, 3 \\
32, 9, 2, 1 \\
0, 3, 23, 8
\end{bmatrix}
\]

\[
a = \text{len}(M)
\]

\[
b = \text{len}(M[0])
\]

What are values of \(a\) and \(b\), and what do they represent?

A) 4, 3
   number of rows, number of columns

B) 3, 4
   number of rows, number of columns

C) 4, 3
   number of columns, number of rows

*D) 3, 4
   number of columns, number of rows
Q26.

In Python the bitwise AND operation is denoted by &, and the bitwise OR operation by |. Suppose the Blue content of a pixel is \( b=\text{0x10100101}. \) Which of the following statements will set the four high bits to zero?

* A) \( b = b \& \text{0b00001111} \)
B) \( b = b \& \text{0b00000000} \)
C) \( b = b \& \text{0b11111111} \)
D) \( b = b \oplus \text{11110000} \)

Q27.

The exclusive or for bit strings, written \(^\oplus\) in Python, is defined by the table:

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

What is printed after executing the following code:

\[
x = \text{0b00011} \\
y = \text{0b10101} \\
x = x \oplus y \\
y = x \oplus y \\
x = x \oplus y \\
print(x, y)
\]

A) 3 21
B) 22 21
C) 22 3
* D) 21 3