There are 35 single choice questions. Each one is worth 4 points. The total score for the exam is 140. Answer the questions on the bubble sheet given to you.

Remember to fill in the following bubble sheet fields:

- **student ID**: use the 10 digit ID number on your student ID card. *DO NOT USE YOUR SOCIAL SECURITY NUMBER!*

- **Last Name and First Name**

- **Instructor**: put your *RECITATION INSTRUCTOR’S LAST NAME* given in the table below

- **Test/Quiz**: put 03

- **Course**: 177

- **Section number**: find your recitation section in the table below and put in the scantron file the last column of the table below

<table>
<thead>
<tr>
<th>Rec. section</th>
<th>Day &amp; time</th>
<th>Rec. Instructor</th>
<th>Sec. number to be used in the scantron card</th>
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</thead>
<tbody>
<tr>
<td>R09</td>
<td>T 7:30</td>
<td>Shen, Bin</td>
<td>0001</td>
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<tr>
<td>R02</td>
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<td>R03</td>
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<td>R05</td>
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<td>R08</td>
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<td>R01</td>
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<td>RM1</td>
<td>W 10:30</td>
<td>Dai, Chenyun</td>
<td>0009</td>
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<td>R07</td>
<td>W 1:30 PM</td>
<td>Surendra Kumar,Gnana</td>
<td>0010</td>
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<td>R06</td>
<td>W 3:30 PM</td>
<td>Surendra Kumar,Gnana</td>
<td>0011</td>
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- Exams without names will be graded as zero.
- Only the answers on the bubble sheet will be counted.
- The questions will be discarded.

Remember to fill in also the fields on page 2 (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. If you are unclear about the question please ask a TA or Instructor.
Question 1:

What will the following code print:

def funnyFunc1(msg):
    x = len(msg)-1
    newMsg = ""
    while(x>=0):
        newMsg = newMsg + msg[x]
        x=x-1
    if msg==newMsg:
        return True
    else:
        return False

print(funnyFunc1("this is a string"))

A) True
B) IndexError: Index out of range
C) “odd”
D) False *
Question 2:

What will the following code print:

```python
def funnyFunc2(msg):
    myDict = {}
    myMax = 0
    myMaxChar = ""
    for x in msg:
        if(x in myDict):
            myDict[x] = myDict[x] + 1
        else:
            myDict[x] = 1

    for y in myDict:
        if(myDict[y] > myMax):
            myMax = myDict[y]
            myMaxChar = y

    return myMaxChar

print(funnyFunc2("PythonLove"))
```

A) P  
B) t  
C) KeyError: Key not found  
D) o *
Question 3:

What is the output of the following code:

```python
def funnyFunc3():
    months = ('Jan','Feb','Mar','Apr','May','Jun','Jul','Aug','Sep','Oct','Nov','Dec')

    for x in range(len(months)):
        if(months[x] == "Nov"):
            months[x] = "This is start of winter"
        return months[x]
    return 

print(funnyFunc3())
```

A) ('Jan','Feb','Mar','Apr','May','Jun','Jul','Aug','Sep','Oct','Nov', 'Dec')
B) ('Jan','Feb','Mar','Apr','May','Jun','Jul','Aug','Sep','Oct','This is start of winter', 'Dec')
C) TypeError: 'tuple' object does not support item assignment *
D) ""

* This is a reference to a Type Error, indicating that the tuple does not support item assignment.
Question 4:

What will following function return:

```python
def funnyFunc4():
    mylist = [1,2,3,4]
    for x in range(len(mylist)-1, -1, -1):
        for y in range(x):
            (mylist[y], mylist[y+1]) = (mylist[y+1], mylist[y])

    return mylist

print(funnyFunc4())
```

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

What will the following code print:

def funnyFunc5(msg):
    for x in range(len(msg) - 1):
        (msg[x], msg[x+1]) = (msg[x+1], msg[x])
    return msg

print(funnyFunc5("python is good"))

A) python is good
B) This code produces an error*
C) doog si nohtyp
D) yphtno si ogdo
Question 6:

What will following code print:

```python
mylist = [['abc', 3], [], ['def'], 4.5, [3, 5.5], ['ijk']]
print(mylist[2][0][0][1])
```

A) 3
B) 4.5
C) i
D) e *
Question 7

Given the following function:

def function(s):
    i = 0
    while(i < len(s)):
        if ord(s[i]) == ord('A'):
            s = s + "BB"
        if ord(s[i]) == ord('B'):
            s = s.lower()
        if ord(s[i]) == ord('C'):
            s = s.upper()
        i = i + 1
    return s

What is the result of the function call, function("ABCDEABCDE")?

A) ABCDEABCDEBB
B) abcdeabcdebb  *
C) abcdeabcdebbbb
D) ABCDEABCDE
Question 8

Given the following statements,

\[
x = 10
y = 20
a = "Hello"
b = "World!"
\]

which of the following operations are invalid?

I. \[Z = a + b + \text{str}(y)\]
II. \[M = x + y + b[5]\]
III. \[b[5] = \text{"*"}\]
IV. \[d = x/(2 * y - 5 * x + 11)\]

A) I, II and III
B) II, III and IV
C) III only
D) II and III *
Question 9

Given the following function:

def function2(s, c):
    status = True
    a = s[0]
    for i in range(c, len(s), c):
        b = s[i]
        if(a == b):
            a = b
        else:
            return False
    return status

For which of the below function calls does the function return True?

I) function2("123123123123", 3)
II) function2("abcdefgh", 4)
III) function2("4578421348974072", 4)
IV) function2("12131415161718", 3)

A) I, and III *
B) I only
C) I and IV
D) IV only
Question 10

Given the following function,

def parse(s):
    l = s.split("::")
    res = []
    n = l[0].split(",")
    g = l[1].split(",")
    d = l[2].split(",")
    res = [[n[1], n[0]], g, d]
    return res

What does the following function call return?

parse("Smith,John:56,98,12,78,45,67,93:90,20,78")

A) [['John', 'Smith'], ['56', '98', '12', '78', '45', '67', '93', '90', '20', '78']]  
B) [['John', 'Smith'], [56, 98, 12, 78, 45, 67, 93], [90, 20, 78]]  
C) [['John', 'Smith'], ['56', '98', '12', '78', '45', '67', '93'], ['90', '20', '78']]*  
D) [['John', 'Smith', '56', '98', '12', '78', '45', '67', '93', '90', '20', '78']]


Question 11

Given the following function:

```python
def parse(s):
    l = s.split(":\")
    res = []
    n = l[0].split(",")
    g = l[1].split(";")
    res = [[n[1], n[0]], g]
    return res
```

What does the following function call return?

```python
parse("Smith,John:56,98,12,78,45,67,93:90")
```

A) `[['John', 'Smith'], ['56', '98', '12', '78', '45', '67', '93', '90']]`
B) `[['John', 'Smith'], ['56,98,12,78,45,67,93']]` *
C) `[['John', 'Smith'], ['56', '98', '12', '78', '45', '67', '93'], ['90']]`
D) `[['John', 'Smith', '56', '98', '12', '78', '45', '67', '93', '90']]`
Question 12

Which of the following four functions correctly reverse a given string?

I) def reverse(s):
    if s == "":
        return s
    else:
        return reverse(s[1:]) + s[0]

II) def reverse2(s):
    output = ""
    for i in range(1, len(s)):
        output = output + s[len(s) - 1 - i]
    return output

III) def reverse3(s):
    output = ""
    i = len(s)
    while(i >= 0):
        output = output + s[i]
        i = i - 1
    return output

A) I  *
B) I, II and III
C) I and II
D) I and III
Question 13:

What is the output of the following python program?

def myFun(x, y, z):
    if(z == 1):
        return (x + y)
    else:
        return (y + x)

print(myFun(myFun('P','Y',2),myFun('TH',myFun('N','O',1),2),1))

A) YPNOTH*
B) PYTHNO
C) PYNOTH
D) ONTHYP
**Question 14:**

Which of the following definitions will let $x$ equal to 7 and $y$ equal to -1 if you run the code

$$(x, y) = \text{myFun}(3, 4)$$

A)
```python
def myFun(a,b):
    x= a+ b
    y= a-b
    return x
    return y
```

B)
```python
def myFun(a,b):
    x= a+ b
    y = a-b
    print(x, y)
```

C)*
```python
def myFun(a,b):
    x= a+ b
    y = a-b
    return (x, y)
```

D)
```python
def myFun(a,b):
    x= a+ b
    return x
    y = a-b
    return y
```
Question 15:
What is the output of the following Python Code?

```python
def args(x,y):
    x = 'Hello'
    return x
    y = 'World'
    return y
    z = x + y
    return z

print(args('World', 'Hello'))
```

A) Hello*
B) World
C) HelloWorld
D) WorldHello
Question 16:

What is the output of the following Python Code?

```python
nameA = 'Tom'
nameB = 'Jerry'
def myFun(nameA, nameB):
    nameA = nameA + nameB
    return nameA
nameB = myFun(nameB, nameA)
print(nameA+nameB)
```

A) TomJerryTom*
B) TomJerryTomJerry
C) TomJerryJerryTom
D) JerryTom
Question 17

What is the output of the following python program?

```python
x = 10
def myFun(y):
global x
    x = y + 1
    return x

myFun(x)
x = x+2
print(x)
```

A) 10  
B) 11  
C) 12  
D) 13 *
Question 18

What is the output of the following python program?

def myFun(x):
    x = x + 1
    return x

x = 10
x = x+1
myFun(x)
x = x+2
print(x)

A) 10  
B) 11  
C) 13*  
D) 14
**Question 19.**

Consider the following loop, what sequence of numbers are printed:

```python
sum = 0
x = 10
while x >= 1 and sum <= 21:
    sum = sum + x
    x = x - 3
    print(sum)
```

A) * 10, 17, 21, 22
B) 17, 21, 22
C) 10, 17, 21, 22, 20
D) 10, 17, 21
Question 20.

Please rank the following sorting algorithms in ascending order with respect to their complexities. You can assume for bucket sort the list we are sorting consists only of integers and you know the min and max of these integers.

1) bucket sort
2) bubble sort
3) merge sort

A. 3) 1) 2)  
B. 1) 3) 2) *  
C. 1) 2) 3)  
D. 3) 2) 1)
Question 21

What is the time complexity for linear search and binary search? For a list of a million sorted numbers, which algorithm will perform better?

A) $O(n)$, $O(\log(n))$, linear search perform better.
B) $O(\log(n))$, $O(n)$, binary search perform better.
C) $O(\log(n))$, $O(\log(n))$, they have same performance
D) * $O(n)$, $O(\log(n))$, binary search perform better.
Question 22:

What is the output of the following python program?

```python
sum = 0
x = 10
while x >= 1:
    sum = sum + x
    print(x)
```

A) 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
B) 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0
C) 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,... (infinite loop) *
D) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Question 23

Given the equation: \( x = 700000^n + 9999n^2 + n! + \log(n) \)

What is the growth term (i.e. the term that will be the largest when \( n \) is very big)?

A) 9999\( n^2 \)
B) 700000\( ^n \)
C) \log(n) \)
D) n! *
Question 24

Which of the following Big O terms is the least complex (i.e. would correspond to the fastest algorithm)?

A) $O(n)$
B) $O(\log(n))$ *
C) $O(n \log(n)$
D) $O(n^2)$
Question 25:

What is the output of the following Python Program?

```python
x = "Python!"
x.upper()
x.lower()
print(x*3)
```

A) the code produces an error  
B) "PYTHON!PYTHON!PYTHON!"  
C) "Python!Python!Python!" *  
D) "python!python!python!"
Question 26:

What is the output of the following Python Program?

def func(v):
    if v==0:
        return
    print(v)
    func(v-1)
func(10)

A) 10 9 8 7 6 5 4 3 2 1 0
B) 1 2 3 4 5 6 7 8 9 10
C) This program will produce an error
D) 10 9 8 7 6 5 4 3 2 1 *
Question 27:

What is the output of the following Python Program?

Hint: you should write out the “trace” of the recursion

def func(n,k):
    if k==1:
        return n
    elif k==n:
        return 1
    else:
        return func(n-1,k-1)+func(n-1,k)

func(5,2)

A) 11
B) 10 *
C) 12
D) This code produces an error
Question 28:

Consider the following tree:

tree = ["l","t", ["l","t"], ["l","t"], ["l","t","l"]]

Which of the following will select out “t”: 

I) tree[2][0][1]  
II) tree[0][1]  
III) tree[0][2][1]  
IV) tree[1][1]

A) I and II  
B) I, II, and III  
C) I, II, III, and IV  
D) II and III
Question 29

Consider if we are deciding which sorting algorithm we should use on a list of integers that we know nothing about. Which sorting algorithm should use?

a) bubble sort  
b) bucket sort  
c) either bucket sort or merge sort, it doesn't matter which we pick  
d) merge sort *
Question 30

What is the output of the following function?

```python
def recursive(x):
    if x > 1:
        return recursive(x-1) - recursive(x-2)
    else:
        return 1

print (recursive(3))
```

A) -1
B) 0
C) 1
D) this code produces an error
Question 31:

Which of the following Python structures are mutable:

I) Strings
II) Lists
III) Dictionaries
IV) Tuples

A) II and III *
B) I, II, III and IV
C) I and IV
D) I and III
Consider the following search function:

```
def mySearch(something, aList):
    for item in aList:
        if item < something:
            return "Found"
        elif item > something:
            return "Not Found"
```

For which of the following lists will the function mySearch return “Found” when searching for 5 (i.e. something = 5)?

I) [4, 6, 7, 8]  
II) [10, 11, 5, 6]  
III) [13, 5, 14, 18]  
IV) [5, 5, 5, 5]

A) I  
B) I and IV  
C) II and III  
D) I, II, and III
Question 33:

What base ten number is encoded by the binary number 10001?

A) 27
B) 17  *
C) 15
D) 9
Question 34:

What is the output of the following python code?

def args(x,y):
    z = x+y
    return z

print(args(1,2,3))

a) 5  
b) NONE  
c) 3  
d) the code produces an error *
Question 35:

What is the output of the following code?

def matFun():
    Mat = [[1,2,3], [4,5,6], [2,4,5]]
    x = 0
    for i in range(3):
        x = x + Mat[2][i]
    print(x*2)
matFun()