There are 50 single choice questions. Each one is worth 4 points. The total score for the exam is 200 points.

Answer the questions on the bubble sheet given.

Fill in the Instructor, Course, Signature, Test, and Date blanks in the bubble sheet. For “Instructor” put your RECITATION INSTRUCTOR’S LAST NAME given in the table below. For “Course” put CS 177. For “Test/Quiz” put 03.

Fill in the bubbles that correspond to your name, section and Student ID in the bubble sheet. For your section number, use the SECTION NUMBER of your recitation section. Consult the following list:

<table>
<thead>
<tr>
<th>Sec</th>
<th>Rec Time</th>
<th>Rec Room</th>
<th>Rec Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>WED 08:30</td>
<td>BRNG 1242</td>
<td>Kazi Mohammad</td>
</tr>
<tr>
<td>0002</td>
<td>WED 09:30</td>
<td>LWSN 1106</td>
<td>Ruby Tahboub</td>
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<tr>
<td>0003</td>
<td>WED 10:30</td>
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<td>0004</td>
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<td>0005</td>
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<td>Uzunbaz Serkan</td>
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<td>0005</td>
<td>FR 16:30</td>
<td>HAAS G066</td>
<td>Uzunbaz Serkan</td>
</tr>
</tbody>
</table>

For your student ID, use the 10 digit ID number on your student ID card. DO NOT USE YOUR SOCIAL SECURITY NUMBER!

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.
Recitation Section Number

Recitation TA’s Name

Student Last Name

Student First Name
Q1. Which set of statements given below give the same results?

A) `print int(1.0/2.0)`
   `print 1 / 2`

B) `print 1 / 2.0`
   `print int(1 / 2.0)`

C) `print 1.0 / 2`
   `print int(1.0 / 2)`

D) `print 1 / 2`
   `print 1 / 2.0`

Q2. Given two numbers in binary format $a = 010101, b = 000111$, compute the 2’s complement of $a+b$. Which one of the following is the correct answer?

A) 100011
B) 100101
C) 100100
D) 100110

Q3. What happens when the following function is executed?

```python
def guess_the_function():
    i = 0
    while 1==1:
        print "CS177"
        i = i + 1
    if ( i > 10):
        i = 0
```

A) The function displays CS177 10 times.
B) The function displays CS177 11 times.
C) The function never enters the while loop.
D) The code does not compile due to a syntax error.
Q4. A DNA string consists of four characters \{A, T, C, G\}. Consider the following function:

```python
def finalexam2(s):
    t = s;
    for i in range(0,len(s)):
        if (s[i] == 'A'):
            c = 'T'
        elif (s[i] == 'T'):
            c = 'A'
        elif (s[i] == 'C'):
            c = 'G'
        else:
            c = 'C'
        if i == 0:
            t = c + t[1: ]
        elif (i == len(t) - 1):
            t = t[:i] + c
        else:
            t = t[:i] + c + t[i+1:]
    print t
```

If s=”ATCGCCTGA”, what’s the value of t?

A) TAGCCGACT
B) ATCGCCTGA
C) TAGCGGACT
D) ATCGCGTGA
Q5. Consider this program:

```python
def testMe(p, q, r):
    if(q > 50):
        print r
    value = 10
    for i in range(1, p):
        value = value - 1
    print value
    print r
```

If we execute `testMe(5, 50, "Hello World")`, what will it print?

(A) Hello World
   10
   Hello World

(B) 6
   Hello World

(C) Hello World
   5
   Hello World

(D) 5
   Hello World
Q6. What will the following function print?

```python
def function():
    picture = makePicture(pickAFile())
    print show(picture)
```

A) The name of the image file that was chosen
B) Picture, filename <Name of the image file> height <Height of the picture> width <width of the picture>
C) Nothing
D) ‘None’

Q7. Consider the following function `func`. What does the function do to the input `picture pic`?

```python
def func(pic):
    for pixel in getPixels(pic):
        r = getRed(pixel)
        g = getGreen(pixel)
        b = getBlue(pixel)

        newColor = makeColor(b, g, r)
        setColor(pixel, newColor)
    return
```

A) It swaps the red component color with the blue component color for each pixel inside the picture pic.
B) It swaps the red component color with the green component color for each pixel inside the picture pic.
C) It swaps the green component color with the blue component color for each pixel inside the picture pic.
D) It does not change anything in picture pic.
Q8. Consider the following function. What text will you see in the bottom right corner of the input picture?

```python
    def func(picture):
        w = getWidth(picture)
        h = getHeight(picture)
        addText(picture, 0, 0, "good")
        addText(picture, w-1, h-1, "evening")
```

A) good evening
B) good
C) evening
D) nothing

Q9. Which property allows us to perceive edges in an image?

A) Brightness
B) Luminance
C) Color
D) None of the above

Q10. What are the properties of the JPEG format for images?

(i) It is a Bit-Map representation
(ii) The compression is lossy
(iii) It is a vector based graphical representation
(iv) The compression is lossless

A) (i) & (iv)
B) (i) & (ii)
C) (iii) & (iv)
D) (iii)
Q11. What does the alpha channel of a pixel indicate?
A) The color that had the maximum value
B) The RED color since it is considered to be most dominant
C) The GREEN color since it is considered to be most dominant
D) The transparency of the pixel

Q12. The distance() function estimates how close a color is to another given color? Which of these statements gives the minimum value?
A) print distance(red, white)
B) print distance(red, black)
C) print distance(blue, white)
D) print distance(green, white)

Q13. Consider the string below:

    hello = "Hello"

    Which of the following print commands will produce the same output?

    (i) print hello[:5]
    (ii) print hello[1:5]
    (iii) print hello[0:]

A) Both (i) and (iii)
B) None of them
C) Both (ii) and (iii)
D) All of them
Q14. Consider the following definition for function `wordFilter`.

```python
def wordFilter(a):
    for i in range(len(a)):
        if len(a[i]) < 5:
            print i, a[i]
        else:
            print "illegal item"
    return
```

Suppose we pass a list `a = ['pear', 'apple', 'orange', 'banana', 'strawberry']` as input to the above function. What is the output of `wordFilter`?

A) 0 pear
    1 apple
    illegal item
    illegal item
    illegal item

B) 0 pear
    illegal item
    illegal item
    illegal item
    illegal item
    illegal item

C) 0 pear
    1 apple
    2 orange
    illegal item
    illegal item

D) 0 pear
    1 apple
    2 orange
    3 banana
    illegal item
Q15. Which of the following statements is **WRONG**?

A) MP3 files are encoded according to the MPEG-3 standard.
B) MP3 files can be compressed with lossy compression.
C) MP3 files can contain also video.
D) WAV files are more compressed than MP3 files

Q16. Which property of a sound determines the sampling rate that must be used to digitize it?

A) The frequency of the sound
B) The pitch of the sound
C) The amplitude of the sound
D) The duration of the sound

Q17. Which of the following relationships is correct?

A) `getLength(sound) = getDuration(sound) * getSamplingRate(sound)`
B) `getDuration(sound) = getLength(sound) * getSamplingRate(sound)`
C) `getSamples(sound) = getDuration(sound) * getSamplingRate(sound)`
D) None of the above.

Q18. Given a certain sound `sound`, which of the following JES functions produce the same result?

1. `getDuration(sound)`
2. `getNumSamples(sound)`
3. `getLength(sound)`
4. `getSamples(sound)`

A) 1. and 2.
B) 1. and 3.
C) 2. and 3.
D) 3. and 4.
Q19. In order to digitize a 440HZ sound wave with good quality, at least how many samples are needed every second?

A) 440  
B) 220  
C) 660  
D) 880

Q20. What is the function performed by the following program?

```python
def guess_the_function(inputfile):
    sound_object = makeSound(getMediaPath(inputfile))
    total = 0
    for source in range(0, 2*getLength(sound_object), 1) :
        value = getSampleValueAt(sound_object, source / 2)
        if(value == 0) :
            total = total + 1
            source = source + 1
    result = total * getSamplingRate(sound_object)
    return result
```

A) It gives the total number of sample points in the sound which have a zero value.  
B) It doubles the frequency of the sound wave.  
C) It gives the amount of time when there is silence in the sound.  
D) It gives twice the total time duration of the sound.

Q21. Which of the following is equivalent to the given two statements below?

```python
s = getSampleObjectAt(sound, 50)
x = getSampleValue(s)
```

A) `x = getSampleValueAt(sound, 50)`  
B) `setSampleValueAt(sound, 50, x)`  
C) `x = getSampleValue(50)`  
D) `x = setSampleValueAt(sound, 50, x)`
Q22. What is the purpose of the following function?

```python
def change(source):
    len = getLength(source) / 4 + 1
    target = makeEmptySound(len)
    targetIndex = 0
    for sourceIndex in range(0, getLength(source), 4):
        value = getSampleValueAt(source, sourceIndex)
        setSampleValueAt(target, targetIndex, value)
        targetIndex = targetIndex + 1
    play(target)
    return target
```

A) Make the target one fourth of the frequency of the source sound object.
B) Make the target four times of the frequency of the source sound object.
C) The target has the same frequency as the source sound object.
D) None of the above is true.

Q23. Which of the following statements about a sound sample is FALSE?

A) the minimum value of a sample is -32768
B) a sample value is stored in 1 byte
C) a sample knows its position in the sound
D) a sample is an object

Q24. What is the amplitude of a wave?

A) The number of cycles per seconds of the wave
B) The difference between the highest and the lowest value of the wave
C) The difference between the top of the cycle and 0
D) none of the above
Q25. Consider the following function:

```python
def myfunc():
    cont1 = 0
    for x in range(0, 10):
        count1 = count1 + x
```

If you want to assign to a variable (result) the output produced by the function above (i.e. `result = myfunc()`):

A) you do not need to change anything in the function

B) you must add at the end of the function the statement: `return`

C) you must add at the end of the function the statement: `return count1`

D) you must add an input parameter count1

Q26. Which of the following is NOT a good suggestion about debugging your program?

A) Be afraid to change the program
B) Use print statements to learn the values of variables
C) Use the Watcher tool in JES to see the execution of the program
D) Use comments to remove code portions temporarily when testing

Q27. Which of the following describes the “Bottom-Up Design” best?

A) Start building pieces you know, test them, combine them, and keep going until you have your program.
B) Start from requirements, then identify the pieces to write, then write the pieces.
C) Figure out the pieces that do not work, and the reason why they do not work and fix them.
D) Add new features to your program, fix the newly discovered bugs, release updates for your program

Q28. Which of the following statements is the correct one to open a JPEG file myfile for reading its content?

A) `open(myfile, "rt")`
B) `open(myfile, "wt")`
C) `open(myfile, "wb")`
D) `open(myfile, "rb")`
Q29. Consider the following function:

```python
def myfunc():
    count1=0
    for x in range(0, 10):
        count1 = count1 + x
    return count1
```

If you write in the JES command window the following statements:

```python
>>> aa = myfunc()
>>> print aa
```

Which will be the result of the `print` statement above?

A) 0
B) 45
C) 50
D) None

Q30. Suppose you have the following string:

```python
Hello = “Hello”
```

What will be the result of the command `print hello[:-1]`?

A) H
B) o
C) Hel
D) Hell
Q31. Consider the following function:

```python
def myFun():
    content = "every sky has a silver lining"
    x = content.find("s");
    y = content.find("s", x+1)
    z = content.rfind("s")
    a = content[y-2 : z+6]
    print a
```

Which of the following will be printed after calling myFun()?

A) sky has a silver  
B) has a silver  
C) has a  
D) ry sky has a silve

Q32. Consider the following function:

```python
def myFunction(str):
    val = str.startswith("Res")
    if val <> 1 :  
        print "Yes"
    else :  
        print "No"
```

Which of the following myFunction calls will print "No"?

A) myFunction("research")  
B) myFunction("RESEARCH")  
C) myFunction("Research")  
D) myFunction("Reference")
Q33 Suppose we have a string test:

>>> test = "this"

Which of the following statements will NOT result in an error?

i) print isalpha(this)
ii) print isalpha(test)
iii) print test.isalpha('this')
iv) print test.isalpha()

A) only iv)
B) iii) and iv)
C) ii)
D) none of them

Q34. What are ALL the possible values of the following statements?

>>> import random
>>> print int( (random.random())*5 )/5

A) 1
B) 0
C) 0, 1, 2, 3, 4
D) 1, 2, 3, 4, 5

Q35. Consider the following URL:


Which of the following is the path?

A) ftp
B) ftp.funet.fi
C) pub/standards/RFC
D) rfc959.txt
Q36. Which of the following HTML results in printing a HTML heading in largest character size?

A) h3
B) h5
C) h1
D) h6

Q37. Which of the following is FALSE about HTML tags?

A) All of the tags have a closing tag
B) The content of some tags may contain other tags making nested tags
C) The tags can take parameters to make some settings
D) Browsers forgive some missing tags

Q38. What is the resulting HTML page of the following HTML code?

```
<html>
<body>
<h1>Welcome to CS 177 Home Page</h1>
<p>You have a final exam on <br/>
<b>December 16th</b></p>
</body>
</html>
```
Q39. If you want to get the content of a web page content from a Python program, which Python module you should import?

A) none  
B) the os module  
C) the random module  
D) the urllib module

Q40. Suppose you have the following list:

```python
myList = ["A", "B", "C", "D", "A"]
```

Which of the following statements is true about the command:

```python
>>> myList.replace("A", "X")
```

A) It will print 
   
   ["X", "B", "C", "D", "A"]

B) It will print 
   
   ["X", "B", "C", "D", "X"]

C) It will print 
   
   ["A", "B", "C", "D", "X"]

D) It will cause an error because lists do not have a replace method

Q41. Consider the following list:

```python
list = ['We', 'are', 'in', ['our', 'CS', ['177', [ 'Final', 'Exam']]]]
```

What is the output of the following statement:

```python
>>> print list[3][2][1][1][1]
```

A) Exam  
B) x  
C) our  
D) Final
Q42. Which of the following lists can be mapped to a picture using the `listToPicture` function?

```python
def listToPicture(list):
    picture = makePicture(getMediaPath("640x480.jpg"))
    for p in list:
        if p[0] <= getWidth(picture) and p[1] <= getHeight(picture):
            setColor(getPixel(picture,p[0],p[1]),makeColor(p[2],p[3],p[4]))
    return picture
```

A) `list = [-5910, -4427, 5619, 5343, ... ]`
B) `list = []`
C) `list = [[168, 131, 105], [168, 131, 105], ... ]`
D) `list = [[1, 1, 168, 131, 105], [1, 2, 168, 131, 105], ... ]`

Q43. Which of the following is the fastest storage?

A) Cache
B) Hard disk
C) RAM
D) Flash disk

Q44. If you have the following list:

```python
tree = [[' Leaf 10 ',' Leaf 4 '], [' Leaf 3 ',' Leaf 7 '], [' Leaf 6 '], [' Leaf 2 ',' Leaf 8 ',' Leaf 9 ']]
```

Which of the following print statements will produce the output:

```
Leaf 4  Leaf 8  Leaf 6
```

A) `print tree[1][1] + tree[3][0] + tree[2][0]`
B) `print tree[0][1] + tree[3][1] + tree[2][0]`
C) `print tree[0][0] + tree[1][1] + tree[3][2]`
D) `print tree[0][1] + tree[3][2] + tree[2][0]`
Q45. Suppose you have four functions to sort a list called: sort1, sort2, sort3, and sort4. The complexity of each function in Big-O is given as follows:

sort1: $O(n)$
sort2: $O(n^2)$
sort3: $O(n \log n)$
sort4: $O(\log n)$

Which of the previous functions performs the least number of steps?
A) sort4  
B) sort1  
C) sort2  
D) sort3

Q46. Which of the following is **FALSE** when one compares the linear (sequential) search algorithm to that of the binary search? (n is the size of the list)

A) Binary search runs in $O(n \log n)$ time  
B) Binary search is faster than linear search at the worst case  
C) We can do binary search only if our list is sorted  
D) In linear search, we need to look at $n/2$ elements on average
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Q47. The following code searches for a given number in a given list of integers:

```python
def arcaneSearch(number, list):
    start = 0
    end = len(list) - 1
    while start <= end:
        checkpoint = int((start+end) / 2.0)
        if list[checkpoint] == number:
            return "Found it!"
        if list[checkpoint] < number:
            end=checkpoint - 1
        if list[checkpoint] > number:
            start=checkpoint + 1
    return "Not found"
```

Which of the following is **TRUE** about this searching algorithm?

A) The algorithm assumes that the list is sorted in ascending (increasing) order  
B) The algorithm runs perfect for any list in any order  
C) The algorithm always causes an infinite loop  
D) The algorithm assumes that the list is sorted in descending (decreasing) order

Q48. Given the following two functions:

```python
def cube(n):
    return n * n * n

def multiply(a, b):
    return a * b
```

What are the outputs of the following two statements?

```python
>>> map(cube, [1, 2, 3, 4])
>>> reduce(multiply, [1, 2, 3, 4])
```

A) 64 and [1, 4, 9, 16]  
B) [1, 4, 9, 16] and [1, 2, 6, 12]  
C) [1, 8, 27, 64] and 24  
D) 24 and 64
Q49. The following code searches for a given number in a given list of integers:

```python
def arcaneSearch(number, list):
    start = 0
    end = len(list) - 1
    while start <= end:
        checkpoint = int((start+end) / 2.0)
        if list[checkpoint] == number:
            return "Found it!"
        if list[checkpoint] < number:
            end=checkpoint - 1
        if list[checkpoint] > number:
            start=checkpoint + 1
    return "Not found"
```

Which of the following is TRUE about this searching algorithm?

A) The algorithm assumes that the list is sorted in ascending (increasing) order  
B) The algorithm assumes that the list is sorted in descending (decreasing) order  
C) The algorithm runs perfect for any list in any order  
D) The algorithm always causes an infinite loop

Q50. We are given the following class definition for clock:

```python
class clock:
    def tellTheTime(self):
        print "The time is ", self.hour, ": ", self.minute
```

We first run the following commands to create a clock object and set the clock:

```python
>>> myClock = clock()
>>> myClock.hour = 10
>>> myClock.minute = 59
```

What statement should we use if we want to know the time of myClock?

A) tellTheTime(myClock)  
B) tellTheTime(clock.myClock)  
C) myClock.tellTheTime()  
D) clock.tellTheTime()
Q48. Suppose that the variable `tree` is the following list:

```python
tree=[ [ "Leaf1", "Leaf2"], ["Leaf3", "Leaf4"] ], ["Leaf5", "Leaf6", "Leaf7"] ]
```

If you want to output the string “Leaf4” using the command `print tree[x][y][z]`, what should be the values of x, y, and z?

A) 010  
B) 011  
C) 101  
D) 100

Q10(Sq10). Which of the following is NOT an advantage of Object-Oriented Programming?

~OK

A) Less replication of code  
B) A polymorphic method can be applied to more than one object  
C) Separation of the data and behavior related to that data in different places  
D) Aggregation of objects, so that there are objects in other objects  
E) `clock.tellTheTime()`

Q22. What is the result of the following function?

```python
def guess_the_function(sound_object):
    len = getLength(sound_object)
    target = makeEmptySound(len)
    targetIndex = 0
    for sourceIndex in range(getLength(sound_object)):
        value1 = getSampleValueAt(sound_object, sourceIndex)
        value2 = getSampleValueAt(target, targetIndex)
        temp = value1
        value1 = value2
        value2 = temp
        targetIndex = targetIndex + 1
```

A) The `sound_object` becomes empty.
B) The `sound_object` gets copied into `target`.

C) The `sound_object` becomes empty and `target` gets all the sample points corresponding to the initial `sound_object`.

D) The `target` contains an empty sound and the `sound_object` remains unchanged.