CS 1301 CS1 with Robots Spring 2009 – Exam 2
You have 50 minutes for this exam.

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1. Vocabulary Matching: (15 points) – 1 point each
Write the number from the correct definition in the blank next to each term on the left:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>14. compound data type</td>
<td>1. A part of a string specified by a range of indices.</td>
</tr>
<tr>
<td>5. aliases</td>
<td>2. A compound data type whose elements can be assigned new values.</td>
</tr>
<tr>
<td>7. sequence</td>
<td>3. The process of calling the function that is currently executing.</td>
</tr>
<tr>
<td>3. recursion</td>
<td>4. Repeated execution of a set of statements using either a recursive function call or a loop.</td>
</tr>
<tr>
<td>4. iteration</td>
<td>5. Multiple variables that contain references to the same object.</td>
</tr>
<tr>
<td>1. slice</td>
<td>6. To move through the elements of a sequence, such as a list, performing a similar operation on each.</td>
</tr>
<tr>
<td>6. traverse</td>
<td>7. Any of the data types that consist of an ordered set of elements, with each element identified by an index.</td>
</tr>
<tr>
<td>8. nested list</td>
<td>8. A list that is an element of another list.</td>
</tr>
<tr>
<td>13. clone</td>
<td>9. To increase the value of a variable by one.</td>
</tr>
<tr>
<td>12. immutable type</td>
<td>10. To decrease the value of a variable by one.</td>
</tr>
<tr>
<td>2. mutable</td>
<td>11. One of the values in a list (or other sequence). The bracket operator selects an __________ of a list.</td>
</tr>
<tr>
<td>9. increment</td>
<td>12. A type in which the elements cannot be modified. Assignments to elements or slices of these types cause an error.</td>
</tr>
<tr>
<td>15. semantic error</td>
<td>13. To create a new object that has the same value as an existing object.</td>
</tr>
<tr>
<td>10. decrement</td>
<td>14. A data type in which the values are made up of components, or elements, that are themselves values.</td>
</tr>
<tr>
<td>11. element</td>
<td>15. Does not display red text to the console or interrupt the program from running.</td>
</tr>
</tbody>
</table>
2. Program Comprehension - N_Lines (3 points)
def n_lines(n):
    print "Line!"
    if (n >= 0):
        n_lines(n - 1)

How many times will the string “Line!” be printed when n_lines is called with n=4?
Number_______6______  - 3 points, all or nothing

3. Robot Directions (10 points)
The following code makes the robot drive the trajectory drawn in the box to the right.

```
def turn90degrees():
    turnRight(1, 1)

def nudge(x):
    forward(1, x)

nudge(1)
turn90degrees()
nudge(1)
nudge(2)
```

Draw the robot's trajectory when the following code is executed. Start the robot in the middle of the box and use arrow heads (as above) to indicate each movement.

```
def turn90degrees():
    turnRight(1, 1)

def nudge(x):
    forward(1, x)

nums = [4, 3, 2, 1]

for i in nums:
    if (i % 2 == 0):
        turn90degrees()
nudge(i)
```

5 pts – Turns before 4 & 2
5 pts – Nudges each time, but less (corresponding to I)
4. Fill in the blank (5 points) - 1 point each
In python, the = operator performs _____ assignment _______ while the == operator performs ___ equality _________.

Python has several compound data types that we have learned about. A ____ string _____ can be used to store a sequence of characters, while a __ tuple ______ can store a sequence of any type of data (but is immutable). A __ list _____ can also store any type of data, and allows you to change elements within it.

5. Python Expression Evaluation (20 points) – 2 pts each (small errors -1 – such as lower case Booleans, an extra element in the list, or no quotes around strings)

For this question, assume the following statements have already been entered and interpreted:

```python
a = [ 5, 10, 15, True, ["Cherry", "Apple", "Plum"], 56, [4, 5, 6], 84 ]
b = a
c = a[0:4]
d = a[4]
d[2] = "Peach"
```

Pretend that you are the Python Interpreter (IDLE window). What do you print or return when each of the following statements are entered?

Example:   a[0]  
Result:   5

Example:  a[1:4]  
Result:  [10, 15, True ]

1.  a[6][0]  
   Result:  4

2.  d  
   Result:  [“Cherry”, “Apple”, “Peach”]

3.  c  
   Result:  [5, 10, 15, True]

4.  a[4][2]  
   Result:  “Peach”

5.  b[:2]  
   Result:  [5, 10]

6.  b[-2]  
   Result:  [4, 5, 6]

7.  c[-2]  
   Result:  15

8.  print "Pumpkin %.3f" %3.1459  
   Result:  “Pumpkin 3.146”

9.  (5 > 10) or (5 > 3)  
   Result:  True

10.  34 % 10  
    Result:  4
6. Write Code – Change Letter (10 points)
Write a function `changeLetter(aString, index, newLetter)` that will replace the letter stored at index in `aString` with the contents of `newLetter` and return the new string without modifying the original string! For example, `changeLetter("Python is great!", 10, "G")` will return the string "Python is Great!"

```python
def changeLetter(aString, index, newLetter):
    newString = aString[:index] + newLetter + aString[index + 1:]
    return newString
```

2 pts for correct header
6 pts for correct modification
- 2 indexing before
- 2 adding `newLetter` in right place
- 2 indexing after
2 pts for returning the string

7. Write Code – Change Value (5 points)
Write a function `changeValue(aList, index, newValue)` that will replace the element stored at index in `aList` with the contents of `newValue`. It should NOT return the list. For example after the following commands:

```python
a = [5, True,"Test",10]
changeValue( a, 3, "Hi!")
```

The list `a` will be [5, True,"Test","Hi!"]

```python
def changeValue(aList, index, newValue):
    aList[index] = newValue
```

1 pt – header
1 pt – no return
3 pt – change right value
8. Reading Code – Return Smallest (6 points)

# This function accepts 3 parameters (x,y,z) and is supposed
# to return the smallest of the 3.
def return_smallest(x,y,z):
    if ( x < y) and ( x < z):
        return( x )
    elif ( y < x) and (y < z):
        return( y )
    else:
        return( z )

a. What is wrong with the above code?
No checks for equality
2 pts

b. Give an example input that would produce an error.
(2, 2, 15)
2pts

c. Tell how to fix the problem.
change the < to <=
2pts
9. Write Code - myLength (15 points)

Write a function myLength (sequence) that returns the length of the sequence. (In essence, you are re-implementing the system's len(x) function.) Obviously, you may not use the len(x) or any other system functions to do the work for you.

myLength("test")   #evaluates to 4
myLength([1,2,3])  #evaluates to 3
myLength((-2,4,8,2)) #evaluates to 4

```python
def myLength(seq):
    count = 0
    for i in seq:
        count += 1
    return count
```

3 pts – def line  
3 pts – using a counter  
4 pts – iterate correctly  
3 pts – increment counter  
2 pts - return
10. Write Code – Reverse List (15 points)

Write a function `reverseList(aList)` that will return a reversed copy of `aList`. For example, after the following:

```python
a = [5, 10, True, "Hi!"
```

```python
b = reverseList(a)
```

The list `b = ["Hi!", True, 10, 5]`, while `a = [5, 10, True, "Hi!"]`.

```python
def reverseList(aList):
    return aList[::-1]
```

5 pts – def line
10 pts – returns correct thing

OR

```python
def reverseList(aList):
    bList = []
    for x in aList:
        bList = [x] + bList
    return( bList)
```

3 pts – def line
3 pts – making new list
3 pts – correct iteration
3 pts – adds elements to new list
3 pts – returns
Extra Credit (1 point each)

What function do you use to get the Battery voltage? _____getBattery()___________
What is the decimal representation of the binary number \{ 100101\}_2? _____37_______
What is the hexadecimal representation of the decimal number \{62\}_10? _____3E______
What does CSS stand for? Cascading_____ Style_______ Sheet___________