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CS 1301 CS1 with Robots Spring 2009 – Exam 2

You have 50 minutes for this exam.

Problem	Points Earned	Possible Points
1. Vocabulary Matching		15
2. N_Lines		3
3. Robot Directions		10
4. Fill in the Blank		5
5. Expression Evaluation		20
6. Change Letter		10
7. Change Value		5
8. Return Smallest		6
9. My Length		15
10. Reverse List		15
Extra Credit		(4 possible)
Total Score		104

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1. Vocabulary Matching: (15 points)

Write the number from the correct definition in the blank next to each term on the left:

<p>___ compound data type</p> <p>___ aliases</p> <p>___ sequence</p> <p>___ recursion</p> <p>___ iteration</p> <p>___ slice</p> <p>___ traverse</p> <p>___ nested list</p> <p>___ clone</p> <p>___ immutable type</p> <p>___ mutable</p> <p>___ increment</p> <p>___ semantic error</p> <p>___ decrement</p> <p>___ element</p>	<ol style="list-style-type: none">1. A part of a string specified by a range of indices.2. A compound data type whose elements can be assigned new values.3. The process of calling the function that is currently executing.4. Repeated execution of a set of statements using either a recursive function call or a loop.5. Multiple variables that contain references to the same object.6. To move through the elements of a sequence, such as a list, performing a similar operation on each.7. Any of the data types that consist of an ordered set of elements, with each element identified by an index.8. A list that is an element of another list.9. To increase the value of a variable by one.10. To decrease the value of a variable by one.11. One of the values in a list (or other sequence). The bracket operator selects an _____ of a list.12. A type in which the elements cannot be modified. Assignments to elements or slices of these types cause an error.13. To create a new object that has the same value as an existing object.14. A data type in which the values are made up of components, or elements, that are themselves values.15. Does not display red text to the console or interrupt the program from running.
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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 _____

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)
```

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4. Fill in the blank (5 points)

In python, the = operator performs _____ while the == operator performs _____.

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

5. Python Expression Evaluation (20 points)

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

```
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:* _____

2. `d` *Result:* _____

3. `c` *Result:* _____

4. `a[4][2]` *Result:* _____

5. `b[:2]` *Result:* _____

6. `b[-2]` *Result:* _____

7. `c[-2]` *Result:* _____

8. `print "Pumpkin %.3f" %3.1459` *Result:* _____

9. `(5 > 10) or (5 > 3)` *Result:* _____

10. `34 % 10` *Result:* _____

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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!"

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:

```
a = [5, True, "Test", 10]
```

```
changeValue(a, 3, "Hi!")
```

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

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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?

b. Give an example input that would produce an error.

c. Tell how to fix the problem.

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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
```

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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:

$a = [5, 10, True, "Hi!"]$

$b = reverseList(a)$

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

Extra Credit (1 point each)

What function do you use to get the Battery voltage? _____

What is the decimal representation of the binary number $\{100101\}_2$? _____

What is the hexadecimal representation of the decimal number $\{62\}_{10}$? _____

What does CSS stand for? C _____ S _____ S _____