Software Design Midterm Fall 2011

Name:
October 28, 2011

You may use any resources you would like on this exam. You have as much time as you want between now and 10:50 AM Tuesday, November 1st 2011. You may not discuss this exam with anyone but the NINJAs before the due date.

1 Linux Userspace Commands

Write the necessary Linux terminal command to list the files in the current working directory.

Assuming the directory ‘madness’ exists in your present working directory, how would you descend into the directory ‘madness’? Please write out the Linux terminal command to do this.

2 Recursion

see Section 2: Recursion

Here is a recursive function that takes a string and returns a reversed version of the string:

def reverse(s):
    if len(s) < 1:
        return s
    else:
last = s[-1]
others = s[:len(s) - 1]
return last + reverse(others)

2.1

Draw a stack diagram at the program’s deepest level of execution for the following call:

forward = "top"
backward = reverse(forward)

2.2

Explain in one to two sentences of plain English why you get an error when you call reverse() with a list rather than a string as the argument. Example: reverse(["t", "o", "p"])
2.3

Change one line of the function so that it will work on lists rather than strings. The call:

```
reverse(['t', 'o', 'p'])
```

should return

```
['p', 'o', 't']
```

3 On Rays

Write a function that takes an angle in degrees, and returns the number (as an `int`) of the quadrant it lies in. The input angle may be any number.

For your convenience, we have provided a diagram with the quadrants labeled. The Quadrants are labeled in Roman Numerals, your function must return an `int`. For the sake of this problem, 0° lies in quadrant I, 90° lies in quadrant II, 180° lies in quadrant III, and 270° lies in quadrant IV.
4 Recursive Supereven

Write a recursive function that takes a number and returns True if the number is of the form $2^n$ where $n$ is a non-negative integer, and False otherwise. Your function does not have to work for negative input, but you may not use the math module or explicit loops (for, while).

5 It’s On!

5.1 Write a function that takes a list of video game characters followed by their midterm scores, such as the one below, and returns a dictionary which maps the names of the video game characters (keys) to their respective scores (values).

For example, a possible argument to the function could be:


In this case, the return value would be:

{"Link": 72, "Mario": 81, "Samus": 91, "Luigi": 80, "Ness": 110}

5.2 In 2-3 sentences of plain English, please explain the advantage of having this data in a dictionary rather than in a list.
6  Rule 222

Write a function called `triangle(character, filler, height, width)` which prints out an ascii art triangle similar to this:

```
________________________a________________________
_______________________aaa________________________
______________________aaaaa_______________________
_______________________aaaaaa______________________
________________________aaaaaaa____________________
```

the example should result from the call: `triangle("a", ",", 5, 50)`.

7  Never Met a Syntactic Conditional I Didn’t Like

Consider the following code snippet:

```python
def foo(num1, num2):
    if num1 > num2:
        print True
    else:
        print False
```

7.1

In one sentence of plain English, explain what this function does.

7.2

What does this function return?

8  The Last Question

Turn in all your electronic quiz material for questions 3, 4, 5.1 and 6 to your SVN repository. If you need to ask a NINJA for help, or you fail to turn it in, this question will be marked as incorrect.