

University of Pittsburgh

CS 0007 Fall 2009 Test 1 - Sample

There are four questions for a total of 100 points.

Some Python function/method descriptions are given to you.

Otherwise, no other aides or notes are permitted.

We can't help you answer the questions. Otherwise, it gets too noisy, and some people would get more information than others.

Please just follow the instructions, and use your best judgment.

Good luck!

1. (20 points) Consider the code below.

```
def mystery(x):
    y = 0
    z = x
    for i in range(0,4):
        if i * 10 > y:
            y = y + x
        z = z + 5
    return y

if __name__ == '__main__':
    y = 11
    x = mystery(y)
    print x
```

Trace the variable values during execution of this program. Specifically, for each underline in the table below, fill in the value of the variable specified after the line has executed, or write 'NR' (for 'not reached') if that line was not executed. Note: I will use a longer program on the real test, so there is more chance for partial credit. The longer program will include more interesting boolean expressions, and it will definitely have a for loop and if statements. Also, it will test your knowledge of scope more than this one does.

		show values after the line executes			
		during iteration			
		1	2	3	4
y = y + x	y:	-----	-----	-----	-----
z = z + 5	z:	-----	-----	-----	-----

2. (25 points) Complete the following function according to its docstring.

```
def modify_colors(pic):  
    '''Modify the picture 'pic' so that any white pixels are replaced  
    with blue and any black pixels are replaced with white.  Pixels of  
    any other color remain unchanged'''
```

3. (25 points)

Complete the following function according to its docstring description. Note: this one is too easy. I was showing that there may be a question closely related to a lab question.

```
def remove_rightmost_2_digits(num):  
    '''Return int num, but with the rightmost 2 digits removed.  
    Example:  remove_rightmost_digit(4235) returns 42  
    You can assume that the num has at least 3 digits'''
```

4. (30 points) For this question, write a program that prompts the user for a picture file (using `media.choose_file`), and then prompts the user for a color, either `'red'`, `'green'`, or `'blue'` (using `raw_input`). Your program should load the picture, and then, for the color component selected, for each pixel in the picture, it should set that color component to the absolute value of the difference of the other two color components of that pixel. At the end, your program should display the changed picture (using `media.show`).

Your program should define and call exactly one function, `'diff_color'`. Complete that function according to the given docstring. Then, below it, write the main program, which calls this function.

```
if __name__ == '__main__':

def diff_color(pic,color):
    '''Given a picture 'pic' and a string color ('red', 'green', or
    'blue'), for each pixel in 'pic', set that color component to the
    absolute value of the difference of the other two color components
    of that pixel.'''
```

Short Python function/method descriptions:

`__builtins__`

`abs(number)` -> number
Return the absolute value of the argument.

`raw_input([prompt])` -> string
Read a string from standard input.

In Media:

`choose_file()`
Prompt user to pick a file. Return the path to that file.
Change the current working directory to the directory
where the file chosen by the user is

`create_picture(w, h, col=Color(255, 255, 255))`
Return a Picture w pixels wide and h pixels high.
Default Color col is white.

`get_blue(pix)`
Return the blue value of Pixel pix.

`get_red(pix)`
Return the red value of Pixel pix.

`get_green(pix)`
Return the green value of Pixel pix.

`get_color(pix)`
Return the Color object with Pixel pix's RGB values.

`get_pixel(pic, x, y)`
Return the Pixel object at the coordinates (x, y) in Picture pic.

`load_picture(filename)`
Return a Picture object from filename filename.

`set_blue(pix, b)`
Set the blue value of Pixel pix to b.

```
set_green(pix, g)
    Set the green value of Pixel pix to g.

set_red(pix, r)
    Set the red value of Pixel pix to r.

set_color(pix, col)
    Set the RGB values of Pixel pix to those of Color col.

show(pic)
    Display Picture pic in separate window.

Colors:
    media.black

    media.white

    media.blue
```