

INTRODUCTION TO COMPUTER SCIENCE I

Spring 2014

LAB 7 2-D lists

Lists of lists! Create and print these two-dimensional structures.

1 Your assignment

Do the following:

1. **Create a new file** for yourself, `lab7.py`, in which to do your programming. Be sure that it ends with the boilerplate that calls the function `main()` in order to get your program started:

```
if __name__ == '__main__':  
    main()
```

Of course, this step implies that your module will contain a `main()` function that calls on the other functions that you write.

2. **Write a function** `print_grid(g)` that accepts a list of lists as a parameter, and then prints all of those items in a grid format. For example, if we do the following from (say) `main()`...

```
def main():  
    l = [ [11, 12, 13, 14], [21, 22, 23, 24], [31, 32, 33, 34] ]  
    print_grid(l)
```

...then the `print_grid` function should display the following:

```
11 12 13 14  
21 22 23 24  
31 32 33 34
```

3. **Write a function** `make_x_table(rows, cols)` that creates a grid of numbers that is `rows` tall and `cols` wide, such that each element at a given row `r` and a given column `c` is the value $v = r * c$. It must create this table of numbers as a **list of lists**, and then **return** that structure; it should *not* print anything.

For example, if we call `make_x_table(3, 5)`, then we expect a list of lists to be returned with the following values and structure:

```
[ [ 1, 2, 3, 4, 5],  
  [ 2, 4, 6, 8, 10],  
  [ 3, 6, 9, 12, 15] ]
```

4. **Write a function** `make_pascal(rows)` that creates a 2-D list structural that stores the leading `rows` of Pascal's triangle. For example, for `rows = 5`, this function should make the following list of lists:

```
[ [ 1 ],  
  [ 1, 1 ],  
  [ 1, 2, 1 ],  
  [ 1, 3, 3, 1 ],  
  [ 1, 4, 6, 4, 1 ] ]
```

That is, the number on row r and column c is the sum of the values on row $r - 1$ at columns $c - 1$ and c . The edge numbers are always 1.

5. EXTRA CHALLENGE: **Modify your function** `print_grid(g)` such that it makes each printed value in its grid of the same width. That is, assume all of the values to be printed are integers; find the widest integer to print, and then make sure, when printing, that *every* entry occupies that number of spaces. Thus, in spite of different width values, the grid is nicely aligned.

With all of these functions written, write `main()` such that it will demonstrate that each function does its job properly. You should use your `print_grid` function to show the results returned by `make_x_table` and `make_pascal`.

2 Submitting your work

Go to the CS submission system to submit your work for this lab. You need only submit your `lab7.py` module.

This assignment is due on Wednesday, Mar-26, 11:59 pm