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CIRCLE COURSE SECTION: MW 9-11 MW 11-1 MW 6-8
TTh 9-11 TTh 1-3

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Lehman College, CUNY
CMP 167 Final Exam, Version 4, Spring 2015

1. What will the following code print:

```
s = "List'(Processing'(John'(McCarthy"  
a = s[0:3]  
print(a.lower())  
names = s.split("'('"  
print(names)  
b = names[1]  
c = names[-1]  
print(c,b)  
d = a + b[0]  
print('(print "', d.upper(),'")')
```

Output:

2. Write a **complete program** to calculate how much something will weigh on Saturn. Your program should prompt the user for the weight on the Earth and then print out the weight on Saturn. For example, if the user enters 100, your program should print out 108.

The weight of an item on Saturn is 108% of its weight on earth.

3. What is output of the code below:

```
def prob4(washington, adams):  
    if washington < 2:  
        print("Small case")  
        monroe = -1  
    else:  
        print("Complex case")  
        monroe = helper(washington, adams)  
    return(monroe)
```

```
def helper(jefferson, madison):  
    s = ""  
    for j in range(jefferson):  
        print(j, ": ", madison[j])  
        if j % 2 == 0:  
            s = s + madison[j]  
            print("Building s:", s)  
    return(s)
```

Output:

(a) `r = prob4(0, "city")`
`print("Return: ", r)`

Output:

(b) `r = prob4(2, "university")`
`print("Return: ", r)`

Output:

(c) `r = prob4(4, "new york")`
`print("Return: ", r)`

4. Given the following program and input file, what is printed:

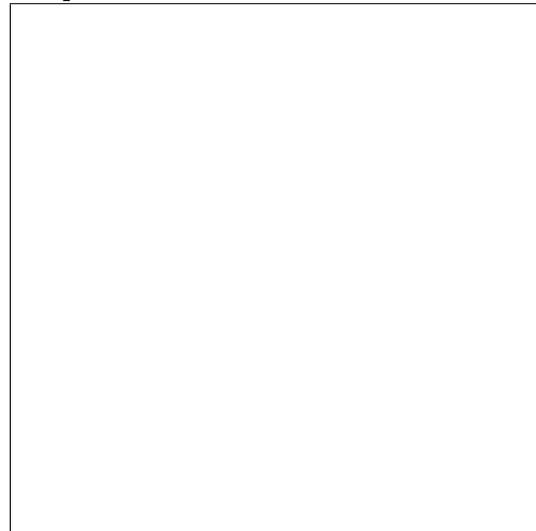
```
def prob5V1():
    c = 0
    infile = open("places.txt","r")
    for line in infile.readlines():
        if len(line) < 7:
            print("Short Line: ", end = "")
            c = c + 1
        print(line)
    print("Num short lines is", c)
```

prob5V1()

places.txt

Greene
Clinton
Warren
Montgomery
Miami
Preble

Output:



5. (a) Write a function that takes number between 1 and 4 as a parameter and returns the corresponding season as a string. For example, if the parameter is 1, your function should return `"winter"`. If the parameter is 2, your function should `"spring"`, etc. If the parameter is not between 1 and 4, your function should return the empty string.

- (b) Write a `main()` that allows the user to enter a number and calls your function to show that it works.

6. Complete the following program, which sets up a graphics window and turtle, draws a decagon (10-sided figure) to the window, and then prints a closing message and closes the graphics window when mouse is clicked. That is, write the functions `setUp()`, `drawDecagon()`, and `conclusion()`:

```
import turtle

def main():
    w,t = setUp()    #sets up a graphics window and turtle
    drawDecagon(t)  #draws a decagon using the turtle
    conclusion(w)    #prints goodbye and closes window on click

main()
```

7. (a) Write a **complete** program that prompts the user for a file name and prints the number of lines in the file.

(b) Write a **complete** program that prints the total area for cities stored in a data file. Your program should open the file, `cityData.csv` and sum the areas (the area is the last value in each line). Note that the first line should not be used since it contains the column headers and not data. The data is separated by commas (","). Your program should **print** the total that you calculated.

cityData.csv:

```
Borough, County, Area (square miles)
Bronx, Bronx, 42
Brooklyn, Kings, 71
Manhattan, New York, 23
Queens, Queens, 109
Staten Island, Richmond, 58
```

8. Write the Python code for the algorithms below:

(a) `getInput()`

Ask user for a string

Until they enter a non-empty string

Print error message

Ask user for a non-empty string

Return the string entered

(b) `sort(ls)`

Set L to be the length of the list ls.

For $i = 0, 1, \dots, L-2$:

For $j = 0, 1, \dots, L-2$:

If `ls[j]` is smaller than `ls[j+1]`, swap the values

Return the list, ls.

9. In lab, we wrote a Tic-Tac-Toe program. Modify the program to check for a winner after each move and keep track of the number of times this occurs. Your program should print out a message if someone has a winning configuration, print out the total winning configurations seen so far, and continue playing. Clearly mark your changes to the design below:

```
#Second Version of Tic-Tac-Toe
from turtle import *
def setUp():
    win, tic = Screen(), Turtle()
    tic.speed(10)
    win.setworldcoordinates(-0.5,-0.5,3.5, 3.5)
    for i in range(1,3):
        tic.up()
        tic.goto(0,i)
        tic.down()
        tic.forward(3)
    tic.left(90)
    for i in range(1,3):
        tic.up()
        tic.goto(i,0)
        tic.down()
        tic.forward(3)
    tic.up()
    board = [["", "", ""], ["", "", ""], ["", "", ""]]
    return(win,tic,board)
def playGame(tic,board):
    for i in range(4):
        x,y = eval(input("Enter x, y coordinates for X's move: "))
        tic.goto(x+.25,y+.25)
        tic.write("X",font=('Arial', 90, 'normal'))
        board[x][y] = "X"
        x,y = eval(input("Enter x, y coordinates for O's move: "))
        tic.goto(x+.25,y+.25)
        tic.write("O",font=('Arial', 90, 'normal'))
        board[x][y] = "O"
        x,y = eval(input("Enter x, y coordinates for X's move: "))
        tic.goto(x+.25,y+.25)
        tic.write("X",font=('Arial', 90, 'normal'))
        board[x][y] = "X"
def checkWinner(board):
    for x in range(3):
        if board[x][0] != "" and (board[x][0] == board[x][1] == board[x][2]):
            return(board[x][0]) #we have a non-empty row that's identical
    for y in range(3):
        if board[0][y] != "" and (board[0][y] == board[1][y] == board[2][y]):
            return(board[0][y]) #we have a non-empty column that's identical
    if board[0][0] != "" and (board[0][0] == board[1][1] == board[2][2]):
        return(board[0][0])
    if board[2][0] != "" and (board[2][0] == board[1][1] == board[2][0]):
        return(board[2][0])
    return("No winner")
def main():
    win,tic,board = setUp() #Set up the window and game board
    playGame(tic,board) #Ask the user for the moves and display
    print("\nThe winner is", checkWinner(board)) #Check for winner
```

10. (a) Write a **complete** class that keeps tracks of information about chocolate. Your class, `Chocolate` should contain instance variables for the `name`, `pricePerPound`, `weight` and `countryOfOrigin`, and should have a constructor method as well as a method, `cost()`, that returns the price (`pricePerPound * weight`) for the chocolate and a method, `getWeight()`, that returns the weight for the chocolate.

- (b) Write a function that takes as input a list of `chocolate`, called `shoppingList`, and returns the most expensive chocolate in the list (i.e. the maximum of all the costs of the chocolate in the inputted list):

```
def maxWeight(shoppingList):
```

Useful String Methods: (from p 140 of textbook)

Function	Meaning
<code>s.capitalize()</code>	Copy of <code>s</code> with only the first character capitalized.
<code>s.center(width)</code>	Copy of <code>s</code> is centered in a field of given width.
<code>s.count(sub)</code>	Count the number of occurrences of <code>sub</code> in <code>s</code> .
<code>s.find(sub)</code>	Find the first position where <code>sub</code> occurs in <code>s</code> .
<code>s.join(list)</code>	Concatenate <code>list</code> into a string using <code>s</code> as a separator.
<code>s.ljust(width)</code>	Like <code>center</code> , but <code>s</code> is left-justified.
<code>s.lower()</code>	Copy of <code>s</code> with all characters converted to lowercase.
<code>s.lstrip()</code>	Copy of <code>s</code> with leading whitespace removed.
<code>s.replace(oldsub,newsub)</code>	Replace all occurrences of <code>oldsub</code> in <code>s</code> with <code>newsub</code> .
<code>s.rfind(sub)</code>	Like <code>find</code> , but returns rightmost position.
<code>s.rjust(sub)</code>	Like <code>center</code> , but <code>s</code> is right-justified.
<code>s.rstrip()</code>	Copy of <code>s</code> with trailing whitespace removed.
<code>s.split()</code>	Split <code>s</code> into a list of substrings.
<code>s.title()</code>	Copy of <code>s</code> with first character of each word capitalized.
<code>s.upper()</code>	Copy of <code>s</code> with all characters converted to uppercase.

Useful Turtle Methods: (from <http://docs.python.org/3.0/library/turtle.html>)

Function	Meaning
<code>t.forward(d)</code>	Move turtle forward <code>d</code> steps
<code>t.backward(d)</code>	Move turtle backward <code>d</code> steps
<code>t.right(angle)</code>	Turn turtle <code>angle</code> degrees to the right
<code>t.left(angle)</code>	Turn turtle <code>angle</code> degrees to the left
<code>t.up()</code>	Pull the pen up: no drawing when moving
<code>t.down()</code>	Pull the pen down: drawing when moving
<code>t.color(c)</code>	Change pen color to color <code>c</code>
<code>t.goto(x,y)</code>	Move turtle to coordinates <code>(x,y)</code>
<code>w.bgcolor(c)</code>	Change background color to color <code>c</code>
<code>w.setworldcoordinates(x1,y1,x2,y2)</code>	Resize drawing area with lower left corner as <code>(x1,y1)</code> and upper right corner <code>(x2,y2)</code>
<code>w.exitonclick()</code>	Closes graphics window on mouse click