CSCD 240
Lab 8

Blaise Pascal was a French mathematician and philosopher who lived in the mid-1600's. He accomplished much in his lifetime, including the construction of a mechanical calculator and some very early work in combinatorics and the development of differential calculus. In his studies, he devised what has become known as *Pascal's Triangle*, http://ptri1.tripod.com/ which simplifies the calculation of the coefficients of the expression $\mathbf{(x + y)^n}$, where ***n*** is a positive integer. That is, we all know

$$\mathbf{(x + y)^2 = x^2 + 2xy + y^2}$$

(implying coefficients of 1,2,1), but what are the coefficients of $(x + y)^3$ or $(x + y)^4$ or $(x + y)^{10}$ By using Pascal's Triangle, these values can be quickly calculated.

The first part of Pascal's Triangle looks like this:
1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

You can see, except for the 1's, any coefficient is found simply by adding together the 2 numbers diagonally above it. (And, if you think about it, picture 0's everywhere along the outside edge, and the 1's can be calculated the same way!)

Write a lab8.c that calculates and displays the first k rows of Pascal's Triangle. Where k is a value entered by the user. It must be displayed in the format shown above (not symmetrically)

- As always I have provided:
  - an unchangeable main
  - an unchangeable lab8.h
- You can't use any statically sized arrays anywhere for this lab
- All Rows must be jagged.

METHODS TO WRITE
int menu(); -- prompts the user with menu choices - must ensure the value entered is between 1 and 4 inclusive
int ** createTriangle(int n); -- creates and fills the appropriate pascals triangle and returns it
int retrieveTotal(char * argv); -- takes the string from the command line as the first passed parameter and converts it to a number. The number must be greater than or equal to 0. If not prompt the user
void cleanUp(int ** pascal, int n); -- cleans up each row first, and the the row of int * second;
void printTriangle(FILE * fout, int ** pascal, int n); - prints pascals triangle for n to the screen
FILE * openOutputFileArgs(char * fn); - receives the filename from the command line and opens it for output

TO TURN IN
A zip file containing Lab8 folder which will contain

- cscd240Lab8.c
- lab8.h
- lab8.c
- utils
    - fileUtils.c
    - fileUtils.h
- cscd240Lab8out.txt – output file with all runs
- cscd240Lab8val.txt – valgrind run

Name your zip your last name first letter of your first name lab8.zip (Example: steinerslab8.zip)