CS 135
Exercise #9
Point value: 40
Date due: email source file (using mail utility) to your lab instructor by 11:59pm Sun, Oct 15

New Skills Practiced (Learning Goals)

- Problem solving and debugging.
- Use of repetition structures (while statement)
- End-of-file controlled looping
- Count-controlled looping
- Nested looping

Given an integer, n, the integers a and b are said to be factors (or divisors) of n if a*b = n.

Given an integer, n, that is greater than 0,

- n is an abundant number if the sum of its factors is greater than 2*n
- n is a deficient number if the sum of its factors is less than 2*n
- n is a perfect number if the sum of its factors is equal to 2*n

Design and implement a complete C++ program that will

- display your name, lecture and lab section #s, and exercise #
- read a series of integers from a file (via Linux redirection) and display (to the screen) a table with 4 columns (n, abundant, deficient, perfect)
- for each integer read from the file, display
    - the integer
    - an 'X' or a blank in the appropriate column of the table (note: if the integer does not fall into any of the 3 categories, leave all columns blank)
- when all data has been read and processed, display the average of the abundant numbers with a label and 2 digits to the right of the decimal

When the program compiles and runs correctly on bobby.cs.unlv.edu, use the mail utility to email a copy of the program file to your lab instructor. Make sure the subject line of your email includes your name, lecture and lab section #s, and the exercise # if you wish to receive full credit.

NOTES:

- Assume that all input values in the data file will be integers (positive, negative, or zero).
- Right justifiy the numbers and 'X's in the table. Assume maximum number of columns needed to display a number is 12.
- When constructing data files, separate each integer with whitespace. Each line in the data file should be terminated with a linefeed.
- It is a good idea to send a carbon copy to yourself (-c option) of all emails sent to your lab or course instructor when using the mail utility.
- A comment with your name, lecture section#, lab section#, and exercise# should be at the start of your program file.

Sample terminal session:

```
[lee@bobby keys]$ more data4nine
4 17 24 -23 0 6 18 28
[lee@bobby keys]$ g++ ex09.cpp
[lee@bobby keys]$ ./a.out < data4nine
Lee Misch Lec# 10__ Lab# 10__ Exercise# 9
```

Input #	Abundant	Deficient	Perfect
4		X	
17		X	
24	X		
-23			
0			
6			X
18	X		
28			X

Average of abundant #s = 21.00

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