Worksheet 2

Problem 1.

This code snippet tries to print all prime numbers between 3 and a given input `n`. Find the three bugs contained in the code and fix them.

```
int n;
cin >> n;
for (int candidate = 3; candidate < n; ++candidate) {
  bool isPrime = true;
  for (int x = 2; x < n; x++) {
    if (candidate % x = 0){
      isPrime = false;
    }
  }
  if (isPrime) {
    cout << n << " ";
  }
}
```

Problem 2.

Write a program that takes in a number as an int and outputs the sum of all of the digits of that number.

Problem 3.

Write a program that takes in `N` numbers and writes their mean.

Problem 4.

Write a program that reads in an integer `N` and prints an `N x N` box where the `(i,j)th` character is as follows:

> '`.`' if `j > i`
>
> `i + j` otherwise

Where `i` is the row number and j is the column number (starting at 0, not 1).

For example, if the input is 4, it should print:

```
0     .     .     .
1     2     .     .
2     3     4     .
3     4     5     6
```

Problem 5.

Write a program that reads in an integer and prints whether that number is a perfect number.

(Hint: A perfect number is defined as a number that is equal to the sum of all factors excluding itself)

Problem 6.

Write a program that takes in an integer `N` where `N > 0`, and outputs all its factors, each one separated by a comma.

Problem 7.

Write a program that takes in an input integer `N` and finds an integer `x` such that $2^x <= N < 2^{x+1}$. The program should ask for user input and print the integer `x` it finds. If there exists no such `x`, it should print "`error`".

Problem 8.

The **Fibonacci series** consists of the integers 0, 1, 1, 2, 3, 5, 8, …. With the initial values $n_1 = 0$ and $n_2 = 1$ it is possible to find the next number, because the next number is related to the preceding two by equation (1).

$$F_n = F_{n-1} + F_{n-2} \quad (1)$$

For example, 1 + 1 = 2, the next number in the series. Based on this information, write a program that receives an integer n as an input and prints the nth Fibonacci number. What is the 10th one? Your program should also check whether the integer provided is valid. If the user inputs zero or a negative number, the program should print `Error: The input must be positive and nothing more`. If you haven't done so already, try to write the program using a do-while loop.

Note: We have not done do-while loops in lecture yet, so I will post the solutions later.