Software Interview Questions:

1. Given a String, what is the best way to remove all spaces and return it. Take into account time complexity and memory efficiency. Assume Strings are arrays of chars. Do not use any standard libraries.
    a. i.e.) This is an example -> Thisisanexample
    b. Solution:
        i. Iterate through all chars in the String. If it hits a space, then shift all the remaining chars back in the array by 1. Do this for every space it hits.
            1. Complexity: O(n^2)
        ii. Create another array. Iterate through all chars in the String. Every char that is not a space is appended to the newly created array.
            1. Complexity: O(n)
            2. Only one traversal of String
2. Create a function that has an integer as it's only parameter. The function should add all natural numbers equal to and less than the integer passed through the parameter.
    a. i.e.) 10 -> 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 +10 = 55
    b. i.e.) 20 -> 1 + 2 + 3 + 4 + … + 18 + 19 + 20 = 210\
    c. Solution:
        i. Void ddd(int i){
            J = i - (i-1)
            sum=0;
            For (k=1;k<i;k++){
                sum = k + sum;
                }

3. Given an array of integers in which all numbers occur even times except for one number. That number occurs odd times, find it.
    a. i.e.) 1, 1, 2, 2, 3 -> 3
    b. Solution:
        i. XOR
        ii. Use a hashmap
        iii. Go through the array and count occurrence for each number.
4. Number spiral
5. The following Regular Expressions (regex) extracts '**451**' from the following input:
   Input: ELE451sd RegEx: \S\S\S(\d*)\S\S or \d+

   Escape characters:

\S – matches any non-white-space character

\s – matches any white-space character

\d – matches any decimal digit

Quantifies:

* - matches the previous element zero or more times

+ - matches the previous element one or more times

Using the above example, write the RegEx to extract '**December 15**' from the following:

Input: Today is December 5, 2017

6. Given a function that returns a random integer from 0 to 5, create a function that will return an integer from 0 to 7. **** (hard)**
7. Create a function that will calculate the angle between the minute and the hour arms of a clock.
8. Create a function in C that will count the number of words in a string. Characters are allowed to be anything, while words are separated by spaces.
9. *Fibonacci sequence* is characterized by the fact that every number after the first two is the sum of the two preceding ones: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144…
   Write a function in any language to calculate n^{th} Fibonacci number.

10. Explain the following terms: encapsulation, polymorphism, exceptions, abstract object.
11. FizzBuzz
    a. Write a program that prints the numbers from 1 to 100, inclusive. For multiples of 3, print out "Fizz". For multiples of 5, print out "Buzz". For multiples of both 3 and 5, print out "FizzBuzz".
    b. SOLUTION:
       i.
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for (int i = 0; i < length; i++) {
    boolean mulOfThree = i % 3 == 0;
    boolean mulOfFive = i % 5 == 0;

    if (mulOfFive && mulOfThree) {
        System.out.println("FizzBuzz");
    } else if (mulOfFive) {
        System.out.println("Buzz");
    } else if (mulOfThree) {
        System.out.println("Fizz");
    }
}
```