Recitation 6 Worksheet 2
Complexity

1. Show that $f(x) = 17 + 3x + 21x^2$ is $O(x^2)$ using witnesses C and k

2. What is the complexity of a program to sort a list of 4 numbers, why?

3. Two ways of implement queues and stacks are with a reference based implementation and with an array based implementation. For both of these implementations, what is the order of each of the following tasks in the worst case?

   - adding an item to a stack of n items

   - adding an item to a queue of n items

4. What is the complexity of a program that counts the 1-bits in a bit string by looking at each bit, one at a time? Count both comparisons and arithmetic operations.

5. Given an integer array, a[], of size n, and some integer value x, what is the complexity of the following code? Count both comparisons and arithmetic operations

   ```
   int pow = 1;
   in val = a[n-1];
   for (int i = n-2; i >= 0; i--) {
         pow *= x;
         val += pow * x[i];
   }
   ```

6. Find the recurrence relation for each of these sequences:

   - 1, 3, 9, 27, 81, 243 ...

   - 1, 7, 19, 43, 91, 187 ...