1. Find a closed form to the following recurrence relation: \( a_n = 5a_{n-1} - 6a_{n-2} + n, \) \( a_0 = 0, a_1 = 1 \)

2. Give an algorithm to decide if \( n \) is even. How fast is your algorithm (what is the time complexity of your algorithm)?

3. Give an algorithm that, given a list of integers \( a_1, a_2, \ldots, a_n \), counts the number of even integers in this list. How fast is your algorithms (what is the time complexity)?

4. Which of the following functions are \( O(1) \)? \( O(n) \)? \( O(n^2) \)?
   (a) \( \log(n^5) \)
   (b) \( n^5 \)
   (c) \( n \log(n + 5) \)
   (d) \( \sin(n) \)
   (e) \( \log_{23470}(n) \)
   (f) \( \frac{1}{n^2} \)
   (g) \( n \log(n^9) + n + 54032 \)