Recent Interview Problems

Problem (Company 1, coding)

1. Given a string s composed of lowercase english characters, write code to output what is the first index of a unique character in s?

2. There are n students with skill levels given by an integer array L. We want to assign these students into groups such that, in each group, the maximum difference in skill in each group is at most m. What is the fewest number of groupsings required to achieve this?

Problem (Company 2, coding)

How many numbers less than 10^{10} have a base-5 representation that consists of only the digits 0 and 1? (you probably will want to write some code for this)

Problem (Company 3)

1. Ava, Henry, and Benjamin are all distinct integer ages. They had the following conversation:

   - Henry to Benjamin: "You're the youngest one."
   - Ava to Henry: "Your age is exactly 60% greater than mine."
   - Ava to Benjamin: "Your age is the average of my age and Henry's age."
   - Benjamin to Ava: "I'm at least 5 years older than you."

   However, not all of these statements are true. When speaking to someone older, the speaker always tells the truth. Otherwise, when speaking to someone younger, the speaker always lies. **How old is Ava?**

2. Three real numbers are chosen from the interval $[0, 4]$ independently and uniformly at random. What is the probability that the smallest number is between 1 and 2?

Problem (Company 4, coding) You are analyzing the movement of a stock over n days where n is even. Each day the stock goes up one or goes down one. It starts out at a price of 0. You notice over the n days the stock price fluctuated but never dipped below its initial price of zero and on the n-th day, it returned to a price of 0. How many different ways could this have occurred? For example, if $n = 2$, there is only 1 way. For $n = 4$, there are 2 ways and for $n = 6$, there are 5 ways? Let $S(n)$ be the number of ways for general even n. Write a program to compute $S(n)$.