Here are some problems to get a feel for the subject.

1. How many different ways can you make change for a dollar?

2. Find the sum of the first 100 odd numbers (i.e., $1 + 3 + 5 + \cdots + 199$).

3. Back in the days of yore, five small towns decided they wanted to build roads connecting each pair of towns. While the towns had plenty of money to build roads as long as they wished, it was very important that the roads not intersect with each other (as stop signs had not yet been invented). Also, tunnels and bridges were not allowed. Is it possible for each of these town to build a road to each of the four other towns without creating any intersections?

4. You need to mail a package, but don't yet know how much postage you will need. You have a large supply of 8-cent stamps and 5-cent stamps. Which amounts of postage can you make exactly using these stamps? Which amounts are impossible to make?

5. A frog intends to hop up a 10 step staircase. On each hop, the frog can jump up 1 or 2 steps. In how many different ways can the frog make it to the top? (One way: 1 step then 2 steps then 2 steps then 1 step then 1 step then 2 steps then 1 step. If he started with 2 steps first, that would be a different way.)

6. Tommy Flanagan was telling you what he ate yesterday afternoon. He tells you, "I had either popcorn or raisins. Also, if I had cucumber sandwiches, then I had soda. But I didn't drink soda or tea. Yeah, that's the ticket." Of course you know that Tommy is the worlds worst liar, and everything he says is false. What did Tommy eat?