1. Find the number of integers between 1 and 100 inclusive that are divisible by 5 or 7.

2. How many permutations of the 26 letters A-Z of the alphabet do not contain the words SNOW, DARK or ICE?

3. How many permutations of the 26 letters A-Z of the alphabet do not contain the words COLD, DARK, or WINTER? (Be careful: because of D and R this is not the same as the previous problem).

4. In how many ways can 8 distinct balls be distributed into 3 distinct boxes if each box must contain at least one ball. (Note: if the balls are not distinct, then the problem can be reduced to a stars and bars type problem. But for this problem, the balls are distinct.)

5. List all the derangements of the digits of 1234.

6. How many derangements of the digits of 123456 begin with 1, 2, and 3 in some order?

7. How many derangements of the digits of 123456 end with 1, 2, and 3 in some order?

8. **Challenge.** Let $D_n$ be the number of derangements of a set of size $n$. Use a combinatorial argument to show that $D_n = (n-1)(D_{n-1} + D_{n-2})$. This problem will not be graded. Come see me if you want a hint.