Questions

Question 1:

- If repetetions are not allowed, find the number of odd 6-digit octal numbers.
- Find the number of odd 6-digit binary numbers.
- If repetetions are not allowed, find the number of odd 6-digit octal numbers that start (from the left) with a 5.
- If repetetions are not allowed, find the number of 6-digit octal numbers that contain 45 (as a substring).
- If repetetions are not allowed, find the number of 6-digit octal numbers that contain 45 or 46 (as substrings).
- If repetetions are not allowed, find the number of 6-digit octal numbers that contain neither 45 nor 46 (as substrings).
- How many permutations of 245369 contain 465 (as a substring)?
- How many permutations of 245369 contain a permutation of 465?

Question 2:

- In how many ways can 5 computer scientists and 8 engineers sit in a row?
- In how many ways can 5 computer scientists and 8 engineers sit around a circular table?
- In how many ways can 5 computer scientists and 8 engineers sit in a row if the computer scientists are to sit together?
- In how many ways can 5 computer scientists and 8 engineers sit in a row if the computer scientists are to sit together and the engineers are to sit together also?
- In how many ways can 5 computer scientists and 8 engineers sit around a circular table if the computer scientists are to sit together?
- In how many ways can 5 computer scientists and 8 engineers sit in a row if no two computer scientists are to sit together?

- In how many ways can 5 computer scientists and 8 engineers sit around a circular table if no two computer scientists are to sit together?

Question 3: A chair, vice chair, and a graduate chair, have to be chosen from a group of seven. The group consists of Dr. A, Dr. B, Dr. C, Dr. D, Dr. E, Dr. F, and Dr. G?

- In how many ways can the assignments be done?
- In how many ways can the assignments be done if Dr. A has to be the chair?
- In how many ways can the assignments be done if Dr. A has to be the chair or the vice chair?
- In how many ways can the assignments be done if Dr. A has to be assigned one of the three positions?
- In how many ways can the assignments be done if the chair position has to be assigned either to Dr. A or to Dr. B?
- In how many ways can the assignments be done if Dr. A has to be the chair and Dr. B has to be excluded?

Question 4:

- How many 6-digit octal numbers read the same from either end?
- How many 6-digit octal strings read the same from either end?
- How many 6-digit odd octal numbers read the same from either end?

Question 5: Let $n \in \mathbb{N}$, $n \geq 2$

- How many n-digit octal numbers read the same from either end?
- How many n-digit octal strings read the same from either end?
- How many n-digit odd octal numbers read the same from either end?

Question 6: Let $n \in \mathbb{N}$, $n \geq 2$

- How many n-digit decimal numbers read the same from either end?

- How many n-digit decimal strings read the same from either end?
- How many n-digit odd decimal numbers read the same from either end?

Question 7:

- How many 10-digit binary numbers read the same from either end?
- How many 10-digit binary strings read the same from either end?
- How many 10-digit odd binary numbers read the same from either end?

Solution of 7:

- 2^4. Remember that if the number is a 10-digit number, then it cannot start with 0 (from the left). So, the first and the last digit have to be 1 here.
- 2^5. Here we can start with 0 from the left.
- 2^4. Obvious.