Quiz 8: Solutions

Problem 1. How many bit strings of length $n$, where $n$ is a positive integer, start and end with 1?

Solution. There are $n - 2$ available slots (the first and the last are occupied with 1), therefore this must be the same number as the number of bit strings of length $n - 2$, i.e., $2^{n-2}$.

Problem 2. How many permutations of the letters A B C D E F G H contain

(a) the string ED?
(b) the string CDE?
(c) the strings BA and FGH?

Solution. (a) If we treat ED as a single letter, then we obtain

$$P(7, 7) = 7! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 = 5040$$

permutations.

(b) If we treat CDE as a single letter, then we obtain

$$P(6, 6) = 6! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 = 720$$

permutations.

(c) If we treat BA and FGH as single letters, then we obtain

$$P(5, 5) = 5! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 = 120$$

permutations.