Exercises 1

Let $F$ be a boolean function on $n$ boolean variables. This means $F$ takes $n$ boolean inputs (zeros and ones) and returns a single boolean output. It is often more convenient to regard $F$ as a function which takes only a single (non-boolean) input. Using binary numbers, describe a natural way we can think of $F$ as a function on the set of integers between 0 and $2^n - 1$.

How many boolean functions are there on $n$ variables?

How many boolean functions $F$ on $n$ variables satisfy the equation $F(x_1, x_2, \ldots, x_n) = F(x_1, x_2, \ldots, x_n)$ for all possible inputs?