

Assignment . Roll No - cns1908 . 22.09.2020

Given a boolean function $f(x) = w \cdot x$ where x & w are n bits of binary strings, give a classical algorithm to find w .

→ let ~~$x = (x_1, x_2, \dots, x_n)$~~
 $x = (x_1, x_2, \dots, x_n)$ and $w = (w_1, \dots, w_n)$ are n bit binary strings.

Then $f(x) = \cancel{w \cdot x} = \sum_{i=1}^n w_i x_i$

Take, $x_j^{(i)} = \begin{cases} 1 & \text{if } j=i \\ 0 & \text{if } j \neq i \end{cases}$

Then $\forall i \in \{1, 2, \dots, n\}$

$$f(x^{(i)}) = w \cdot x^{(i)}$$

$$f(x^{(i)}) = \sum_{j=1}^n w_j x_j^{(i)} = w_i$$

for the above, we can get w by using $w_i, i \in \{1, 2, \dots, n\}$.