

1. Exercise 3.31 of the CC Book: Prove that for “most” Boolean functions f , we have

$$D_{\frac{1}{2}-\epsilon}^{\text{uniform}}(f) = n - O\left(\log \frac{1}{\epsilon}\right).$$

That is, only an exponentially small fraction of the functions have better complexity. Hint: Pick a function at random and compute the probability that it has a “large,” “almost monochromatic” rectangle.

2. Exercise 3.32 of the CC Book: Let $\text{Disc}(f) = \min_{\mu} \text{Disc}_{\mu}(f)$.

(a) Prove that $\text{Disc}(\text{DISJ}) \geq 1/(2n + 1)$.

(b) Prove that for every function f , $R^{\text{pub}}(f) \leq (1/\text{Disc}(f))^{O(1)}$. Hint: Use the distributional complexity.