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In Corollary 4.10, Hougardy *et al.* [HPS95] define the encoding scheme E_0. This function is better known as the Hadamard Code. A more extensive explanation is available from Trevisan [Tre04, Section 3.3.1].

1. Argue that the Hadamard Code actually satisfies the definition of "encoding scheme" given before Definition 4.1 of Hougardy *et al.* [HPS95].

2. To prove Corollary 4.10, we need an algorithm that determines whether a string is $\frac{1}{4}$-close to the encoding of a potential solution — i.e., a codeword. In Section 5.1 of Trevisan, we find an algorithm called BLR that tests whether a string f is "linear." Argue that if f is "linear" then it is a codeword of the Hadamard Code. (Note that $\oplus$ here is bitwise exclusive-or.)

References

[HPS95] S. Hougardy, H. J. Prömel, and A. Steger. Probabilistically checkable proofs and their consequences for approximation algorithms. In W. Deuber, H. J. Prömel, and B. Voigt, editors, *Trends in Discrete Mathematics*, volume 9 of *Topics in Discrete Mathematics*, pages 175–223. North Holland, 1995.

[Tre04] L. Trevisan. Some applications of coding theory in computational complexity. Technical Report TR04-043, Electronic Colloquium on Computational Complexity, 2004.