Information theory and error control coding/Teoria da informação e códigos corretores de erros

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Tutorial Questions/Lista de Exercícios - 1

1. Suppose that a discrete memoryless source is defined over the range of X, , and the corresponding probability values for each symbol are P(X = x1) = 1/2, P(X = x2) =P(X = x3) = 1/8 and P(X = x4) = 1/4. Compute the entropy.
2. A source characterized in the frequency domain with a bandwidth of W = 4000 Hz is sampled at the Nyquist rate, generating a sequence of values taken from the range with the following corresponding set of probabilities
3. Calculate the entropy.
4. Compute the source rate in bits per second.
5. Construct an order-2 extension of Question 1 and calculate its entropy.
6. Prove that and also demonstrate the validity of the inequality by plotting and on the same graph.
7. The output of a discrete memoryless source consists of the possible letters which occur with probabilities , respectively. Prove that the entropy of the source is at most .