

(1) (6 pts) A source has an alphabet size of 10 and p.m.f.

$$\mathbf{p} = (0.23, 0.19, 0.12, 0.12, 0.11, 0.08, 0.07, 0.05, 0.02, 0.01).$$

Construct a (first-order) Huffman code for this source. Calculate the average rate and provide the correct unit. Calculate the entropy of the p.m.f. \mathbf{p} . Does the rate satisfy the bound given in class?

(2) (4 pts) Let $\{X_n\}$ be a SSS first-order moving-average source:

$$X_n = W_n + 0.9W_{n-1} + 0.8W_{n-2}, \quad \forall n,$$

where $\{W_n\}$ is i.i.d. Gaussian with zero mean and unit variance. Determine the autocorrelation function and psd of $\{X_n\}$.