2015 Fall - Information Theory

Homework 4 (Due on Nov. 6th)

Part 1: DMS

Find the CDF at the point $cabbcbbabc$, from the DMS
$P(a) = 0.2, P(b) = 0.3, P(c) = 0.5$
When taken in blocks of length 10, using the recursion seen in class.

Part 2: Decoding

You had already known the CDF of the point $cabbcbbabc$ from HW4. Use the CDF you get to decode this sequence, where $P(a) = 0.2, P(b) = 0.3, P(c) = 0.5$

Part 3: Encoding

Please prove (4.23), which can really generates a prefix-free code.

Part 4: Matlab Exercise

Build and test an algorithm to obtain the CDF F at the point s for a general source described by an input probability vector p for a block length B, where $F = Fcalc(p, B, s)$.

How would you smartly obtain the whole CDF of the block of 10 symbols?

Use arithmetic coding method to build an encoder and a decoder for the same source.