

EE 231A
Information Theory
Instructor: Rick Wesel

Handout #7, Assessment for Part 1, Spring 2020
Thursday, April 16, 2020
Due Thursday April 23, 2020 before class

This assessment is open book and open note, but you may not perform an internet search to seek a worked solution to a problem. Do not ask for help from your classmates or anyone else besides Prof. Wesel and Hengjie.

1. (10 pts) *Harold's Hexagon Hop.*

Harold is hopping around on the hexagons shown below. Harold always hops to an adjacent hexagon (not including the hexagon from where he hopped), and he is equally likely to hop to any of the adjacent hexagons. Assuming Harold started hopping according to the stationary distribution, what is the entropy rate of Harold's hopping?

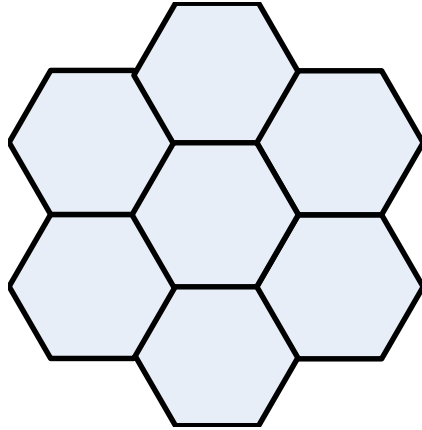


Figure 1: Harold moves to an adjacent hexagon on each hop.

2. (5 pts) *The Asymptotic Composition Property (ACP).*

The sequence x^n is an i.i.d. binary sequence with $p(x=1) = 0.75$. We will refer to $p(x=1)$ as the density of x , $d(x)$.

Consider a new property called the Asymptotic Composition Property (ACP) which states that for any $\epsilon > 0$ the probability that the fraction of ones in x^n is within ϵ of $d(x)$ converges to 1 as $n \rightarrow \infty$. Does the sequence x^n satisfy the ACP? Prove your answer.