## Homework 5

Due: October 10, 2019

## Name:

1. (40 points) Suppose you have an unfair coin that lands on heads $70 \%$ of the time and tails $30 \%$ of the time.
(a) (20 points) Enumerate all the possible outcomes for four flips of the unfair coin in the table below. For the binary representation, assign 0 - Heads and 1 - Tails. I filled in the first two for you.

| Sequence | Binary <br> Representation | Decimal <br> Representation | Probability of Sequence |
| :--- | :--- | :--- | :--- |
| TTTT | 0000 | 0 | $0.3 \times 0.3 \times 0.3 \times 0.3=0.0081$ |
| TTTH | 0001 | 1 | $0.3 \times 0.3 \times 0.3 \times 0.7=0.0189$ |
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(b) (15 points) On the axes below, draw the probability mass function for the sequences of unfair coin flips. The x-axis should have the decimal representation of each sequence. The y-axis should have the probability of the sequence.

(c) (5 points) The typical set is the set of events that is approximately uniformly distributed. Circle the typical set on the graph above.

