3.3/16

Original matrix

	s_1	s_2	s_3	s_4	s_5
s_1	0	0	1	0	0
s_2	0	.4	0	.6	0
s_3	.2	.3	0	.5	0
s_4	0	.5	0	.1	.4
s_5	0	0	0	1	0

We can partition the set of states into two sets of mutually accessible states. First we let S_1 be the set of all states mutually accessible from s_1.

$S_1 = \{s_1, s_3\}$

Now we let S_2 be the set of states mutually accessible from s_2.

$S_2 = \{s_2, s_4, s_5\}$

We reorder the states so the states in S_2 are listed first and form a new transition matrix

		s_2	s_4	s_5	s_1	s_3
S_2	s_2	.4	.6	0	0	0
	s_4	.5	.1	.4	0	0
	s_5	0	1	0	0	0
S_1	s_1	0	0	0	0	1
	s_3	.3	.5	0	.2	0

In S_2 each state has period 1.

In S_1 each state has period 2.

This process is not ergodic.

(You can look at powers of this matrix.)

3.3 / 1d

original matrix

	s_1	s_2	s_3	s_4	s_5
s_1	0	1	0	0	0
s_2	0	0	1	0	0
s_3	.5	0	0	.5	0
s_4	0	0	0	0	1
s_5	0	0	1	0	0

$= \mathbb{T}$

Let S_1 be the set of all states mutually accessible from s_1.

$S_1 = \{s_1, s_2, s_3, s_4, s_5\} = S$ (the set of all states)

✓ So, the process is ergodic and its matrix is already in canonical form. (See defn. 3.5)

The index of each state is 3. Look at the diagonal entries of $\mathbb{T}, \mathbb{T}^2, \mathbb{T}^3$.

The process is not regular because there are zeros in all powers of $\mathbb{T}$.