Lecture C3.Discrete Time Markov Chain 3

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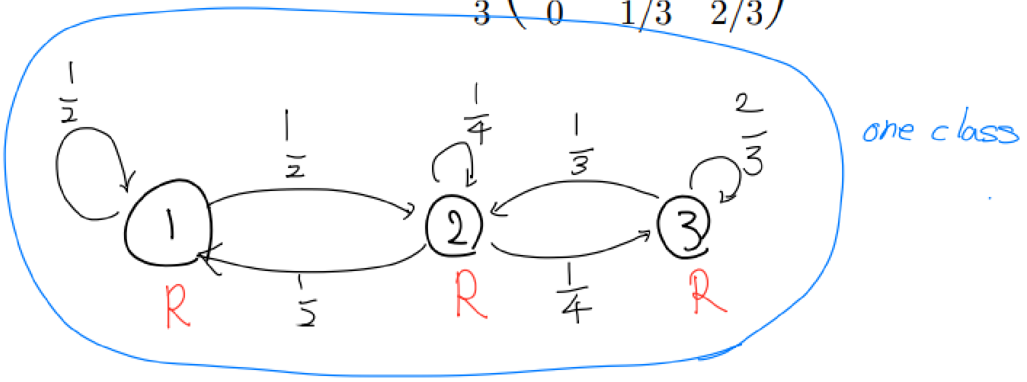
차 례

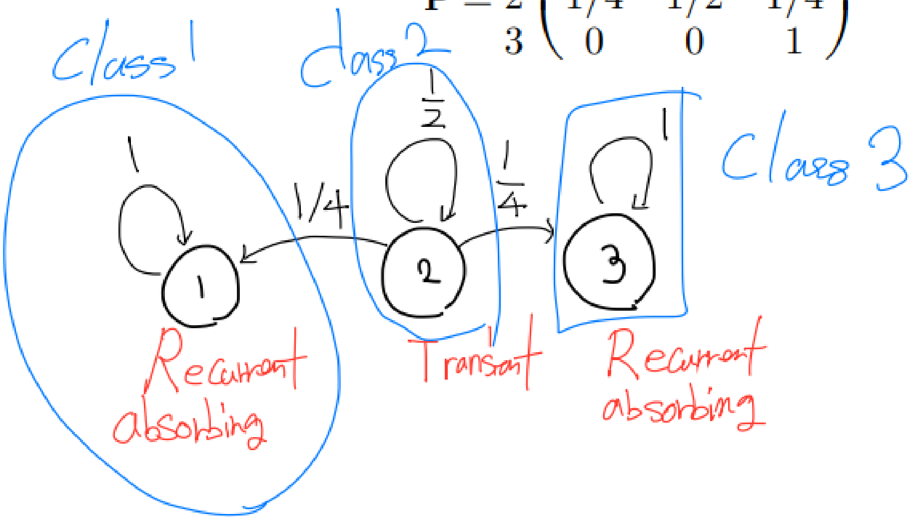
Exercise 1

$$\mathbf{P} = \begin{array}{c} 1 \\ 2 \\ 3 \end{array} \begin{pmatrix} 1/2 & 1/2 & 0 \\ 1/2 & 1/4 & 1/4 \\ 0 & 1/3 & 2/3 \end{pmatrix}$$



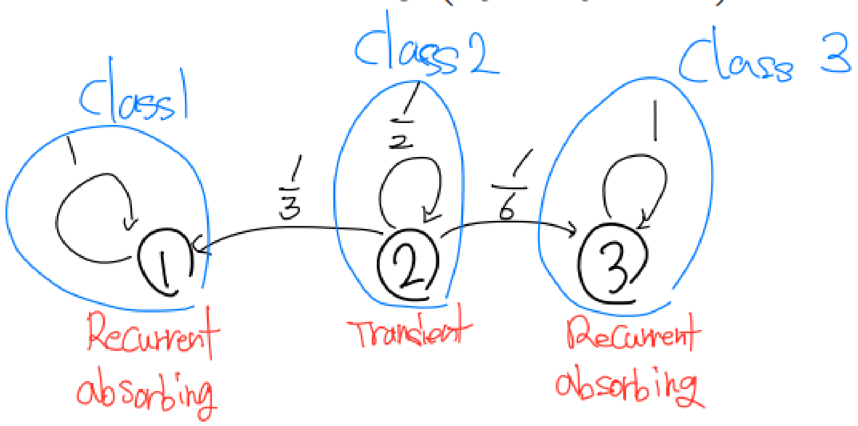
Exercise 2

$$\mathbf{P} = \begin{array}{c} 1 \\ 2 \\ 3 \end{array} \begin{pmatrix} 1 & 0 & 0 \\ 1/4 & 1/2 & 1/4 \\ 0 & 0 & 1 \end{pmatrix}$$



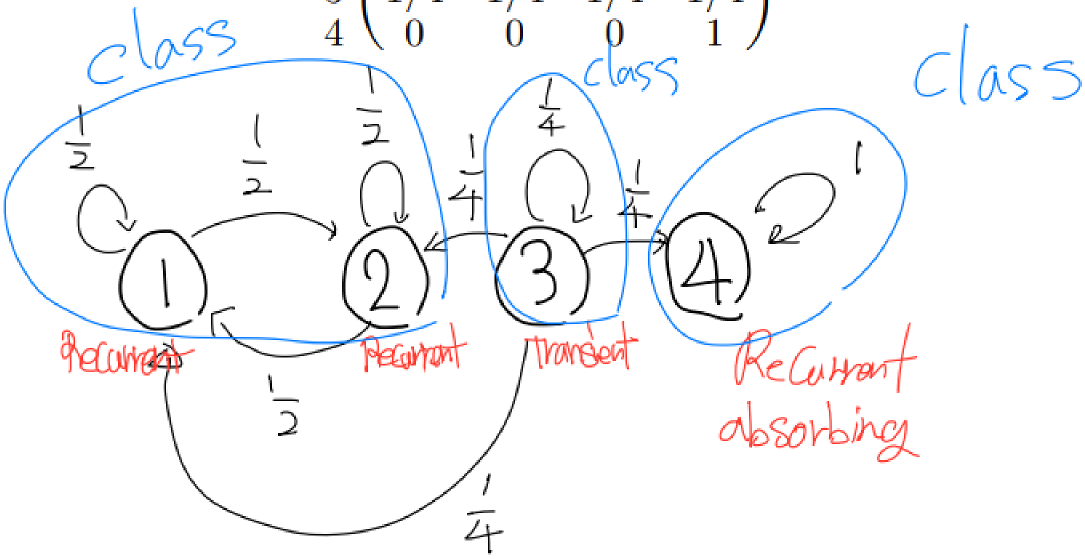
Exercise 3

$$\mathbf{P} = \begin{array}{c} 1 \\ 2 \\ 3 \end{array} \begin{pmatrix} 1 & 0 & 0 \\ 1/3 & 1/2 & 1/6 \\ 0 & 0 & 1 \end{pmatrix}$$



Exercise 4

$$\mathbf{P} = \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{pmatrix} 1/2 & 1/2 & 0 & 0 \\ 1/2 & 1/2 & 0 & 0 \\ 1/4 & 1/4 & 1/4 & 1/4 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$



Random Walk - Stationary Distribution

S = {0,1,2,$\cdots$} and p = 1/3, using flow balance equation.

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$\mathbb{P}[y_t + 2 = (NC, C) \mid Y_t = (C, C)] = \ ?$

Answer

$\mathbb{P}[Y_{t+2} = (NC, N) \mid Y_t = (C, C)] = 0.48$

```
import numpy as np
from numpy.linalg import matrix_power
P = np.array([0.2,0,0.8,0,0.4,0,0.6,0,0,0.6,0,0.4,0,0.8,0,0.2]).reshape(4,4)
print(P)
```

```
## [[0.2 0.  0.8 0. ]
##  [0.4 0.  0.6 0. ]
##  [0.  0.6 0.  0.4]
##  [0.  0.8 0.  0.2]]
```

```
print(matrix_power(P,2))
```

```
## [[0.04 0.48 0.16 0.32]
##  [0.08 0.36 0.32 0.24]
##  [0.24 0.32 0.36 0.08]
##  [0.32 0.16 0.48 0.04]]
```

C3.Rmd

```
"Hello"
```

```
## [1] "Hello"
```