Quiz 3

$$1 \quad 2$$

$$A = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{pmatrix}$$

- random walks on the above graph

$$p_i(t) = \sum_j \frac{A_{ij}}{k_j} p_j(t-1)$$

$$\mathbf{p}(t) = \mathbf{A}\mathbf{D}^{-1}\mathbf{p}(t-1)$$

- $p_i(t)$:probability that the walk is at vertex i at time t

$$\mathbf{D}^{-1} = \begin{pmatrix} 1/k_1 & 0 & 0 & \cdots \\ 0 & 1/k_2 & 0 & \cdots \\ 0 & 0 & 1/k_3 & \cdots \\ \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

- 1. find AD^{-1}

- 2. find $p_1(\infty)$, $p_2(\infty)$, $p_3(\infty)$, and $p_4(\infty)$

- Submit to Tokyo Tech OCW-i

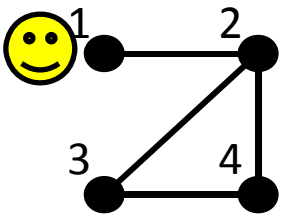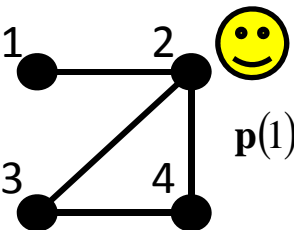- Deadline: 20:??(Japan Standard Time) on Dec. 13(Wed)

random walk on a graph

- **t=0**

$$\mathbf{p}(0) = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad \begin{array}{l} p_1(0)=1 \\ p_2(0)=0 \\ p_3(0)=0 \\ p_4(0)=0 \end{array}$$
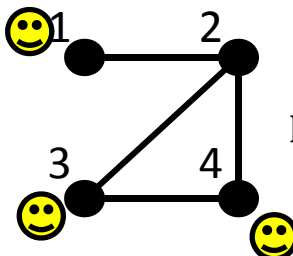
start vertex does not matter

- **t=1**
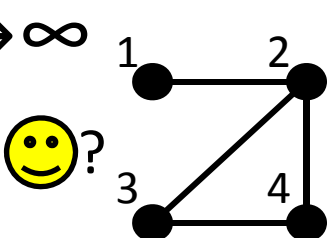
$$\mathbf{p}(1) = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} \quad \begin{array}{l} p_1(1)=0 \\ p_2(1)=1 \\ p_3(1)=0 \\ p_4(1)=0 \end{array}$$

- **t=2**

$$\mathbf{p}(2) = \begin{pmatrix} 1/3 \\ 0 \\ 1/3 \\ 1/3 \end{pmatrix} \quad \begin{array}{l} p_1(2)=1/3 \\ p_2(2)=0 \\ p_3(2)=1/3 \\ p_4(2)=1/3 \end{array}$$

- **t→∞**

$$\mathbf{p}(\infty) = \begin{pmatrix} ? \\ ? \\ ? \\ ? \end{pmatrix} \quad \begin{array}{l} p_1(\infty)=? \\ p_2(\infty)=? \\ p_3(\infty)=? \\ p_4(\infty)=? \end{array}$$

sum should be one