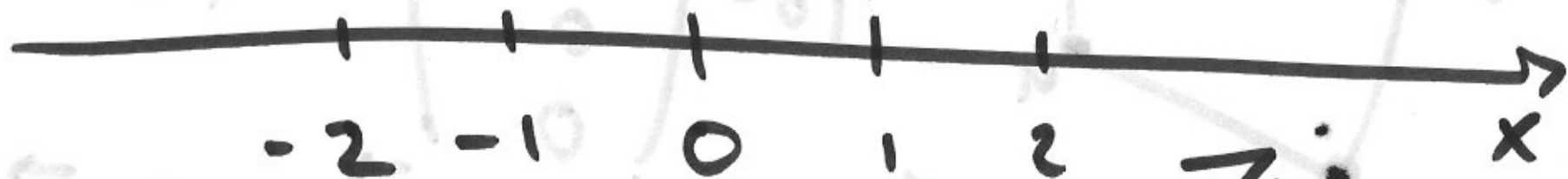
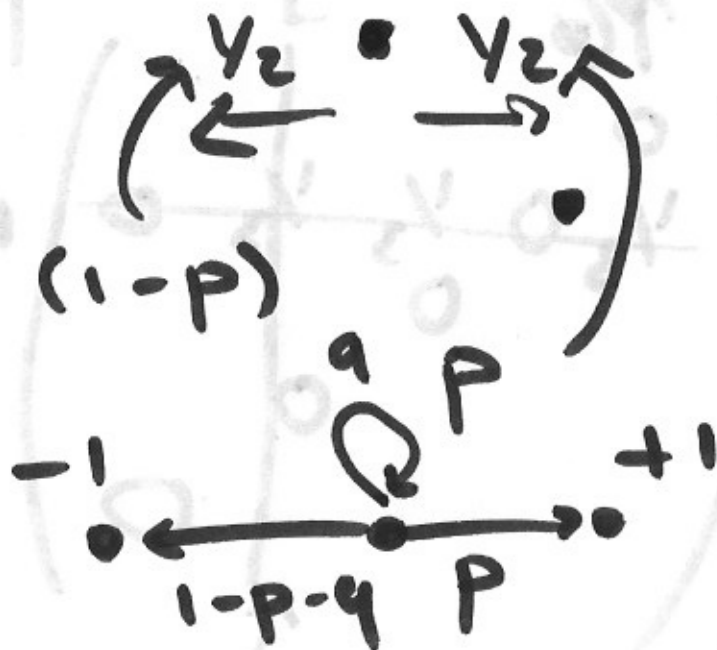


# MSAI - probability - 7



$t=0$   
 $t=1$

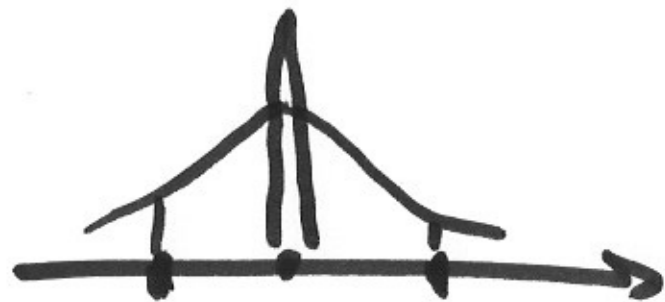


①

$$\xi_i = \begin{cases} +1, & p \\ -1, & 1-p \end{cases}$$

after  $n$  tosses ( $t=n$ )

$$X_n = \sum_{i=1}^n \xi_i$$



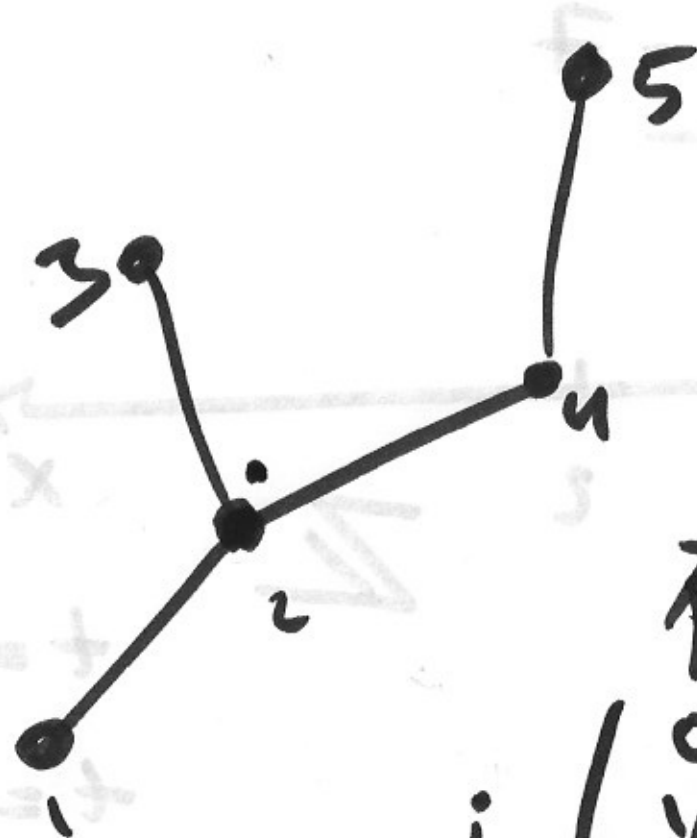
Sum of i.i.d. r.v.

C.L.T:  $\rightarrow$  normal distribution

in the  $n \rightarrow \infty$

$$\sigma \sim \sqrt{n}$$

(2)



$$\vec{P}_0 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} \rightarrow \vec{P}_1$$

$$\vec{P}_{t+1} = M \vec{P}_t$$

$$M = \begin{pmatrix} 0 & 1/3 & 0 & 1/3 & 0 \\ 1/3 & 0 & 1/3 & 1/3 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \leftarrow \text{pr}(j \rightarrow i) \atop t \rightarrow t+1$$

Markov chain

$$P_{t+1}^{(2)} = \frac{1}{3} P_t^{(1)} + \frac{1}{3} \dots$$

connected  
to Laplacian  
matrix