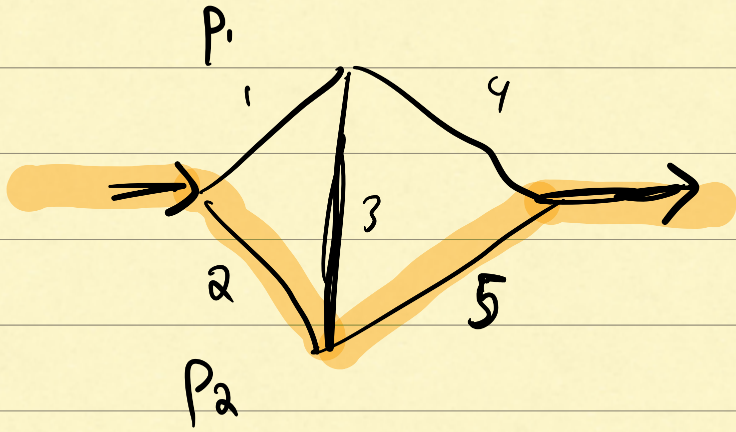
PS 1



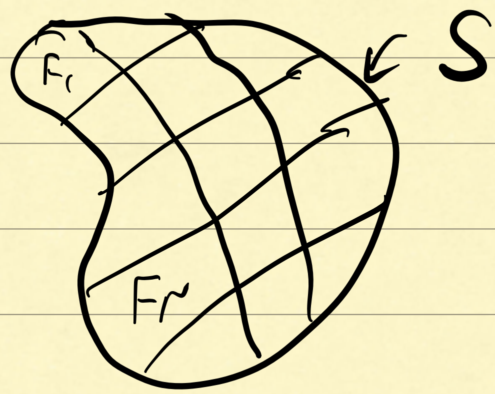
SUPPOSE A SAMPLE SPACE S CAN BE SPLIT INTO SUBSETS

$$F_1, F_2, \ldots F_N$$

SUCH THAT

$$\bigcup F_i = S$$

$$F_i \cap F_j = \text{EMPTY}$$
FOR $i \neq j$



(A PARTITION OF S)

$$\mathbb{P}(e) = \mathbb{P}(e \mid F_1)\,\mathbb{P}(F_1)$$

$$+ \mathbb{P}(e|F_2)\mathbb{P}(F_2)$$
$$+ \mathbb{P}(e|F_3)\mathbb{P}(F_3)$$
$$+ \dots$$
$$+ \mathbb{P}(e|F_N)\mathbb{P}(F_N)$$

LAW OF TOTAL PROBABILITY

ASIDE $\mathbb{P}(e) = \mathbb{P}(e \cap F_1) + \mathbb{P}(e \cap F_2) + \dots$

X - RANDOM VARIABLE

A COLLECTION OF RANDOM VARIABLES

X_t INDEXED BY t IS

CALLED A <u>STOCHASTIC PROCESS</u>.

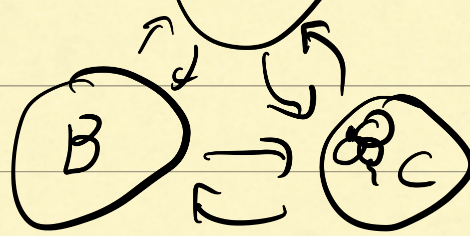
t - DISCRETE OR CONTINUOUS

MARKOV CHAINS

EX EACH MINUTE, A

A

MOUSE TRAVELS BETWEEN 3 ROOMS



ASSUMPTION

$$P(X_t = i \mid X_{t-1} = j, X_{t-2} = k, \ldots) = P(X_t = i \mid X_{t-1} = j)$$

THEN

$$\begin{bmatrix} p_A(t+1) \\ p_B(t+1) \\ p_C(t+1) \end{bmatrix} = \underset{3\times 3}{M} \cdot \begin{bmatrix} p_A(t) \\ p_B(t) \\ p_C(t) \end{bmatrix}$$

WHERE

$$M = \begin{bmatrix} P(X_t = A \mid X_{t-1} = A) & P(X_t = A \mid X_{t-1} = B) & \\ & \cdots & \\ & & P(X_t = C \mid X_{t-1} = C) \end{bmatrix}$$

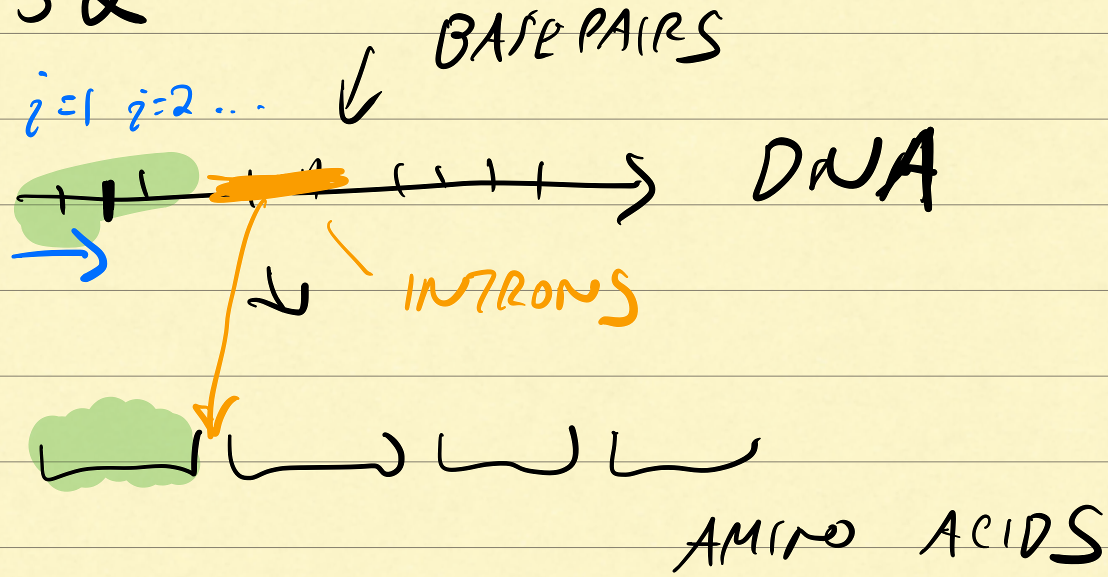
THE p_{ij} ELEMENT OF M

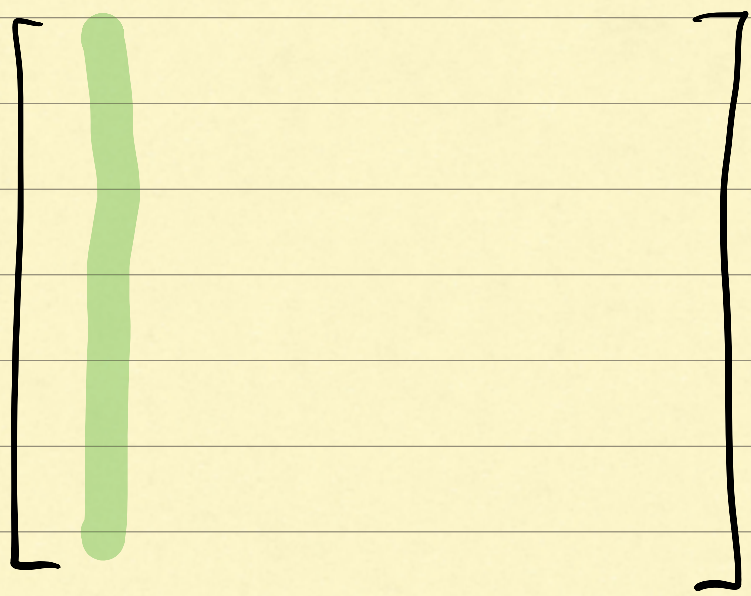
ROW COLUMN

IS

$$p_{i \leftarrow j} = P(X_t = i \mid X_{t-1} = j)$$

PS2





$\Sigma = 1$ 6×6