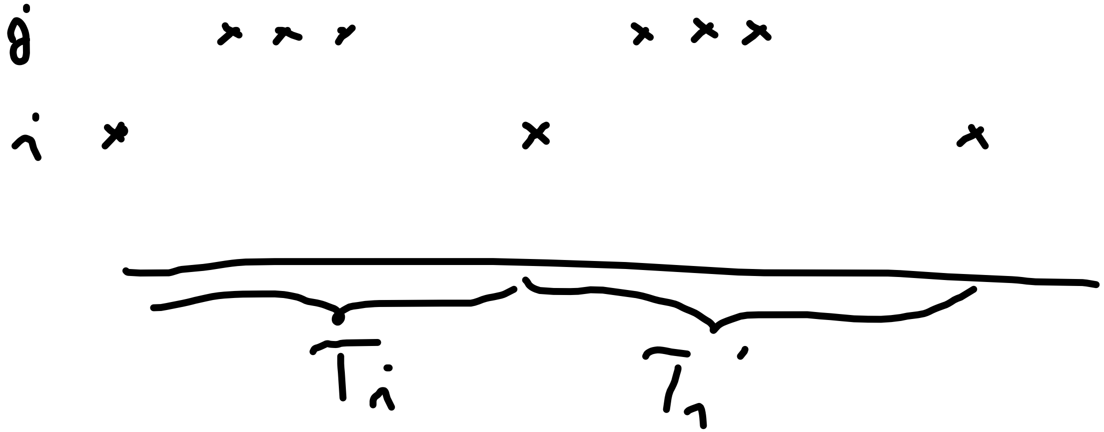
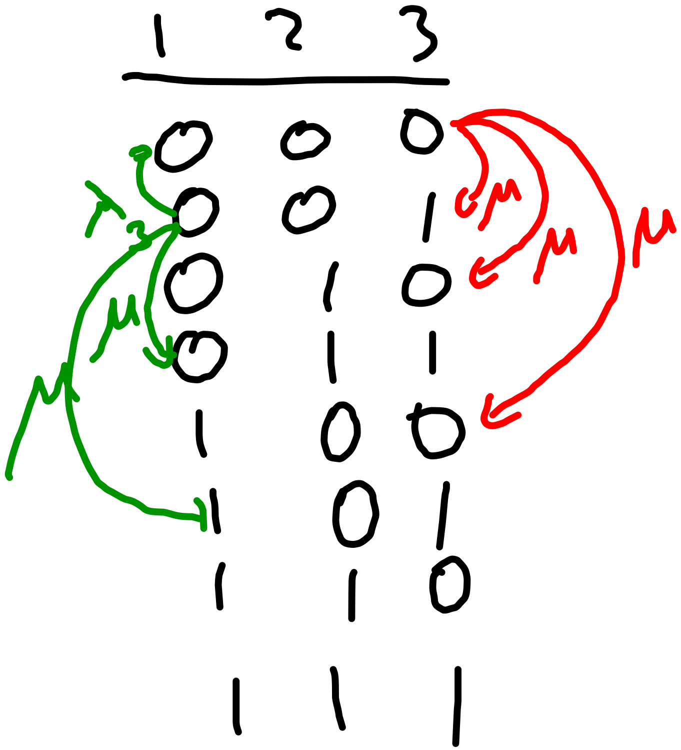


$$\pi_i = \frac{1}{E(T_i)}$$

$$\frac{\pi_j}{\pi_i} = E(\text{ANTAL BESÖK I } j \text{ MELLAN 2 BESÖK I } i)$$

ℓ



0 = 'TRASIG'
1 = 'HEL'

GER Q

$$\underline{O} = \Pi Q$$

$$\begin{cases} \underline{0} = \Pi Q \\ \sum_{i \in E} \pi_i = 1 \end{cases}$$

$$\Pi = (\cdots\cdots)$$

STRYK

$$(\cancel{0}, 0, \dots, 0) = (\cdots\cdots) \begin{pmatrix} \vdots & & \\ \vdots & & \\ \vdots & & \end{pmatrix}$$

$$(1, 0, \dots, 0) = \underbrace{(\cdots\cdots)}_{\Pi} \cdot \begin{pmatrix} 1 & & & \\ 1 & & & \\ 1 & - & 1 \; 1 & - \\ 1 & & & \\ \vdots & & & \\ 1 & & & \end{pmatrix}$$

KENDALL

A/B/c/K

BETJÄNINGSTIDSFÖRDELN.
M = MARKOVIAN; EXP-FÖRD.
D = DETERMINISTISK
G = GENERAL

VÄNTRUM

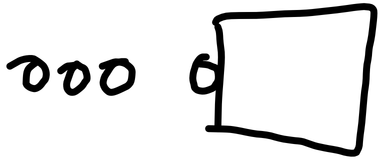
ANKOMSTPROCESS
M = MARKOVIAN : POISSONPROCESS

ANTAL PARALLELLA BETJ. STN

M/M/1

$Exp(\mu)$

$\overrightarrow{Po(\lambda)}$



$\bar{X}(t) =$ ANTAL i SYSTEMET

$$Q = \begin{array}{c} 0 \\ 1 \\ 2 \\ 3 \end{array} \begin{pmatrix} -\lambda & \lambda & 0 & 0 & \cdots \\ \mu & -(\lambda+\mu) & \lambda & & 0 \\ & \ddots & \ddots & \lambda & \ddots \\ 0 & & \ddots & \ddots & \ddots \end{pmatrix}$$

$\rho = \dfrac{\lambda}{\mu} < 1$

TRAFIK-INTENSITET

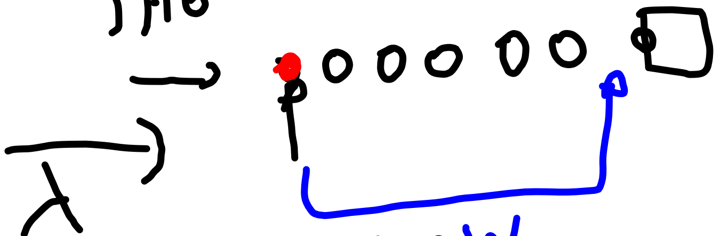
$$P_n = (1-\rho)\rho^n \quad n = 0, 1, 2 \ldots$$

$$l = \sum_{n=0}^{\infty} n \cdot p_n$$

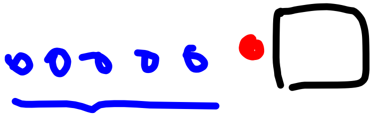
$$l_q = 0 \cdot p_0 + 0 \cdot p_1 + 1 \cdot p_2 + 2 \cdot p_3 + \ldots$$

$$W_q = \frac{l_q}{\lambda}$$

JAG



TAR W_q



HAR KOMMIT UNDER MIN KÖTID

$\approx W_q$

$$\boxed{\lambda \cdot W_q = l_q}$$

$C = 1$ $\quad P_0 = 1 - \rho$ $\quad \underbrace{1 - P_0}_{P(\text{BETJÄNING PÅGÅR})} = \rho$

$\rho = E(\text{ANTAL BETJ.})$

$$\underbrace{l}_{E(\text{SYST.})} = \underbrace{\rho}_{E(\text{BETJ})} + \underbrace{l_q}_{E(\text{KÖN})}$$

$\rho = \frac{\lambda}{c\mu} < 1$

ALLMÄNT $l = c\rho + l_q$

$$\frac{l}{\lambda} = \frac{c\rho}{\lambda} + \underbrace{\frac{l_q}{\lambda}}_{w_q} = \underbrace{\frac{1}{\mu} + w_q}_{W}$$

$$\underline{\Pi} = \pi P$$

$$\underline{Q} = \underline{\Pi}\,(I - P)$$

$$(1, 0, 0, \dots) = \underbrace{(\cdot\;\cdot\;\cdot\;\cdot\;\cdot)}_{\underline{\Pi}} \begin{pmatrix} \vdots & \\ \vdots & \underbrace{\qquad\qquad\qquad}_{\text{I - P RESTEN UTOM KOLUMN 1}} \end{pmatrix}$$

M/G/1

ALLMÄN BETJ. TIDSFÖRD

BETRAKTA ANTAL i SYSTEMET

PRECIS DÅ KUND LÄMNAR SYSTEMET.

SPEC. FALL

M/M/1 $\quad V(U) = \frac{1}{\lambda^2} \quad E(U) = \frac{1}{\lambda}$

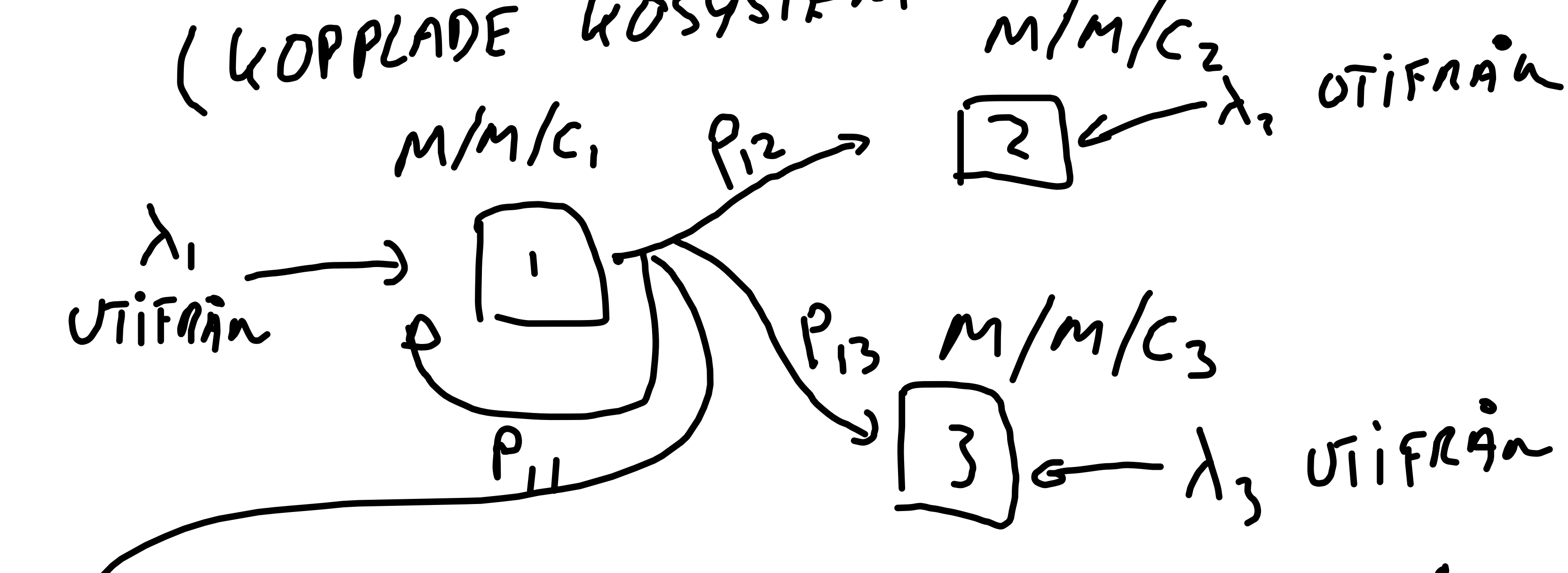
$$l_q = \frac{\rho^2}{2(1-\rho)}(1+1) = \frac{\rho^2}{1-\rho} = l_q$$

FRÅN FS OM M/M/1

$\Rightarrow l, w, w_q$ VIA LITTLES FORMLER

JACKSON-NÄTVERK

(KOPPLADE KÖSYSTEM



$$p_1 = 1 - p_{11} - p_{12} - p_{13} = P(\text{GÅ HEM FRÅN NOD } i)$$

$$\Lambda_1 = \lambda_1 + p_{11}\cdot\Lambda_1 + p_{21}\Lambda_2 + p_{31}\cdot\Lambda_3$$

TOTALT FLÖDE IN I NOD 1

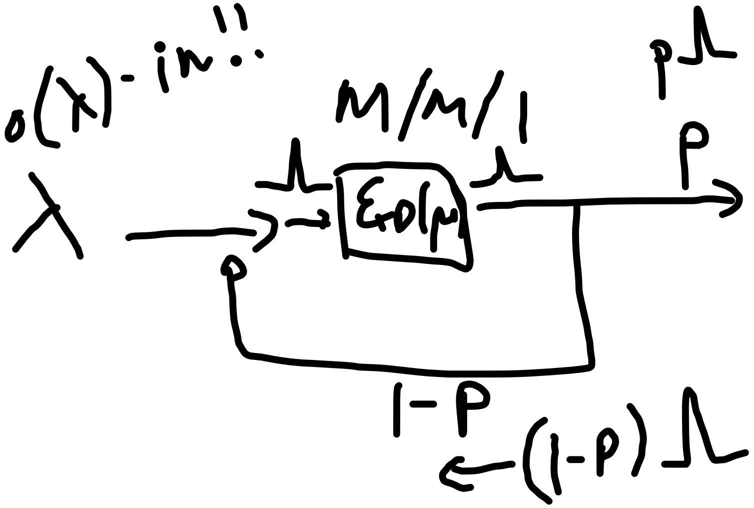
EKV. SYST. GER Λ_i:na

$X_i(t) =$ ANTAL i SYSTEM i

$$\frac{\Lambda_i}{c_i \mu_i} < 1$$

ALLA i

$Po(\lambda)$ - in!!



EJ POISSON-PROCESSER INNE I JACKSON-NÄTVERKET.

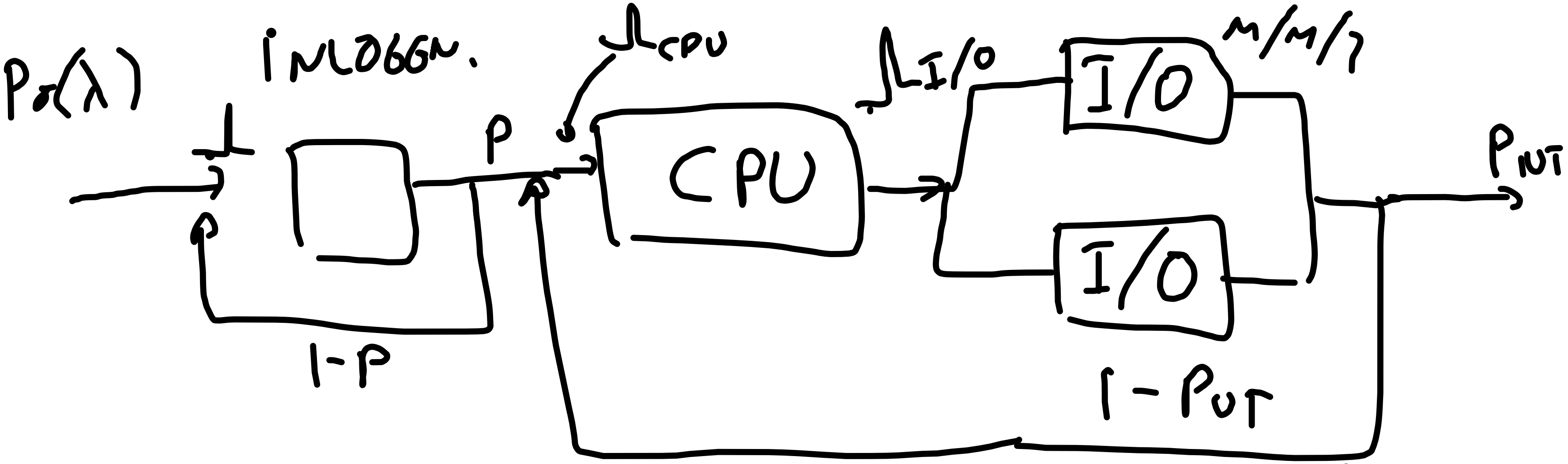
$$\Lambda = \lambda + (1-p)\Lambda$$

$$\Lambda = \frac{\lambda}{p}$$

Ex $p = \frac{1}{2}$

$$\Lambda = 2\lambda$$

$$\rho = \frac{\Lambda}{1 \cdot \mu} = \frac{2\lambda}{\mu} < 1$$



$$\Lambda_{LOGIN} = \lambda + (1-p)\Lambda_{LOGIN} \qquad \Lambda_{LOGIN} = \frac{\lambda}{p}$$

$$\Lambda_{CPU} = p\Lambda_{LOGIN} + (1-P_{UT})\underbrace{\Lambda_{I/O}}_{\Lambda_{CPU}}$$

$$\Lambda_{I/O} = \Lambda_{CPU}$$