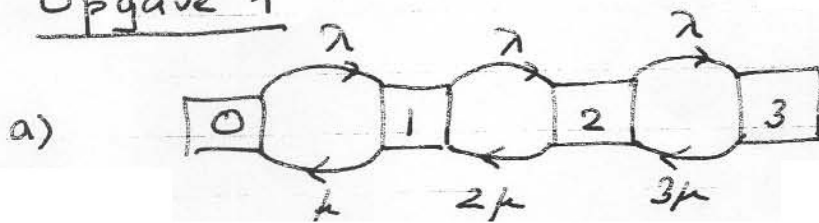


Opgave 1



$\lambda = 1$ (per minuut)

$\mu = \frac{1}{2}$ (per minuut)

$\lambda p_0 = \mu p_1, \lambda p_1 = 2\mu p_2, \lambda p_2 = 3\mu p_3, p_0 + p_1 + p_2 + p_3 = 1$

b) Met $\lambda \cdot \frac{1}{\mu} =: e$

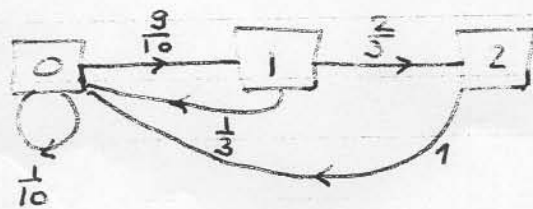
$(p_0, p_1, p_2, p_3) = C (1, e, e^2/2, e^3/6)$

$= \frac{1}{19} (3, 6, 6, 4)$

c) 'Doorzet' = $p_1 \cdot \mu + p_2 \cdot 2\mu + p_3 \cdot 3\mu = 47 \cdot 7/19$

Opgave 2

a) Naar keuze, model "begin jaar" of "eind jaar"
Hier "begin jaar". Toestanden 0, 1 of 2 jaar oud



b)

Evenwichts vergelijkingen:

$p_0 = \frac{1}{10} p_0 + \frac{1}{3} p_1 + p_2$

$p_1 = \frac{9}{10} p_0, p_2 = \frac{2}{3} p_1 = \frac{6}{10} p_0$

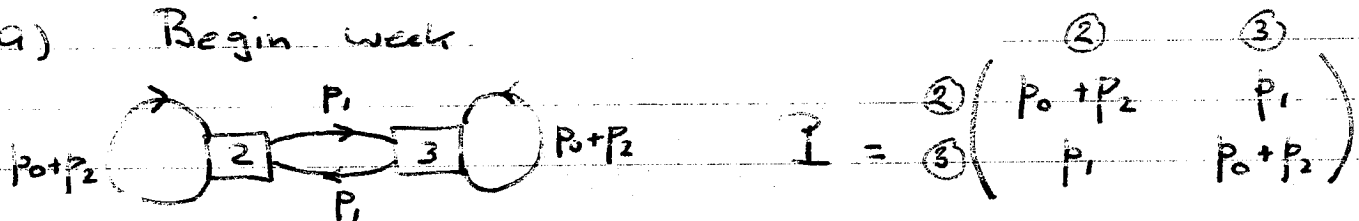
$(p_0, p_1, p_2) = \frac{1}{25} (10, 9, 6)$

Gemiddelde kosten:

$$\begin{aligned}
 & p_0 \cdot 4000 + p_1 \cdot 5000 + p_2 \cdot 5500 \quad [\text{jaarlijkse kosten}] \\
 & + p_0 \cdot \frac{1}{10} \cdot 8000 + p_1 \cdot \frac{1}{3} \cdot 10000 + p_2 \cdot 12000 \quad [\text{vervangings}] \\
 & = 9120 \text{ € per wagen per jaar.}
 \end{aligned}$$

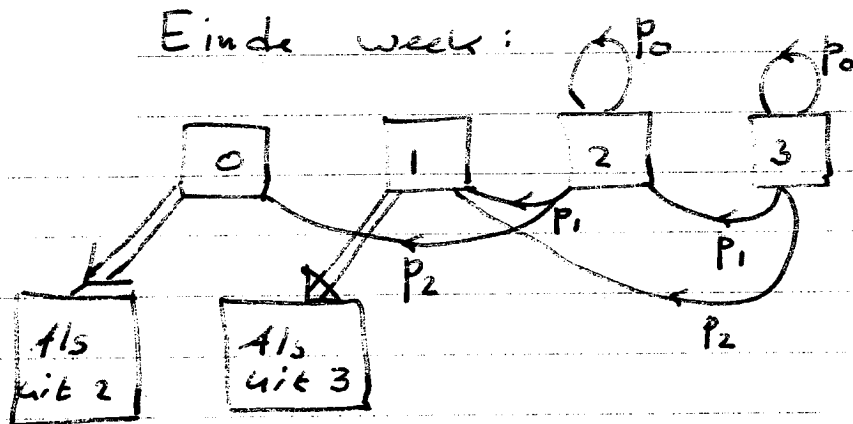
Opgave 3

a) Begin week



$$P = \begin{matrix} & \textcircled{2} & \textcircled{3} \\ \textcircled{2} & p_0 + p_2 & p_1 \\ \textcircled{3} & p_1 & p_0 + p_2 \end{matrix}$$

Einde week:



$$P = \begin{pmatrix} p_2 & p_1 & p_0 & 0 \\ 0 & p_2 & p_1 & p_0 \\ p_2 & p_1 & p_0 & 0 \\ 0 & p_2 & p_1 & p_0 \end{pmatrix}$$

b) Begin week

$$\pi_2 = (p_0 + p_2) \pi_2 + p_1 \pi_3 \Rightarrow \pi_2 = \pi_3 = \frac{1}{2}$$

kosten

$$\begin{aligned}
 & (\pi_2 [2p_0 + p_1] + \pi_3 [3p_0 + 2p_1 + p_2]) * 4 \quad (\text{voorraad}) \\
 & + (\pi_2 [p_1 + p_2] + \pi_3 [p_2]) * 100 \quad (\text{bestelling})
 \end{aligned}$$

Met $p_0 = 0.6, p_1 = 0.3, p_2 = 0.1$ vinden we $8 + 25 = 33 \text{ €}$