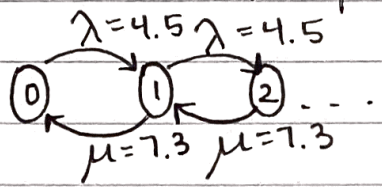
29 Continuous Time Markov Chain → solving problems

EX: Forklift Problem

$X_t \equiv$ # of forklifts in repair facility

- birth/death process



- 22 work days/month

$$54 \text{ trucks} \cdot \frac{1 \text{ yr}}{1 \text{ yr}} \cdot \frac{12 \text{ months}}{\text{month}} \cdot \frac{3 \text{ days}}{1 \text{ truck}} \cdot \frac{\text{month}}{22 \text{ days}} = \mu = 7.3 \frac{\text{trucks}}{\text{month}}$$

$$\lambda = 4.5 \frac{\text{trucks}}{\text{month}}$$

$0: \lambda P_0 = \mu P_1$

$1: (\mu+\lambda) P_1 = \lambda P_0 + \mu P_2$

$2: (\mu+\lambda) P_2 = \lambda P_1 + \mu P_3$

$\vdots$

$26: (\mu+\lambda) P_{26} = \lambda P_{25} + \mu P_{27}$

$27: (\mu) P_{27} = \lambda P_{26}$ $\qquad P_{27} = (\lambda/\mu)^{27} P_0$

$\lambda = 4.5 \qquad n = 27$

$\mu = 7.3$ $\qquad P_0 = \dfrac{(1 - 4.5/7.3)}{(1 - 4.5/7.3)^{28}} = 0.38$

$P_1 = \dfrac{4.5}{7.3}(.38) = .236442$