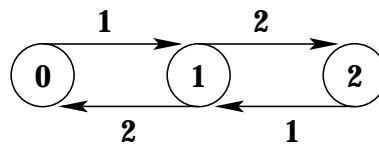*Problems 2–3 are homework exercises. Mark the problems you have solved in the beginning of the exercise class.*

1. *Demo*

   The Ehrenfest model was used, at a time, to shed light on a paradox related to the second law of thermodynamics. The model can be described as follows. A closed system is constructed from $K$ randomly moving gas molecules and two containers which are connected so that each of the molecules changes the container at rate $\lambda$, independently of other molecules. Let $X(t)$ be the number of molecules in the first container. The process is a Markov process, determine its equilibrium distribution. Compare the conditional probabilities $P\{X(t) = K \mid X(0) = \frac{1}{2}K\}$ and $P\{X(t) = \frac{1}{2}K \mid X(0) = K\}$ ($K$ assumed to be even), when $t$ is large.

2. *Homework exercise (1 point)*

   Determine the equilibrium distribution of the following Markov process.

   

3. *Homework exercise (1 point)*

   Determine the equilibrium distribution of the following Markov process.

   