A rental firm has three locations: I, II, and III. A truck rented at one location may be returned to any of the locations. The company's records have data that give the probability of a truck rented at one location being returned to another. From these records the transition matrix is formed. Each location is considered to be a state.

If it is rented from location I it is returned to location I with probability 80% and it is returned to either II or III with an equal probability of 10%

If it is rented from location II it is returned to location II with probability 60% and it is returned to I with probability 30%

If it is rented from location III it is returned to location III with probability 70% and it is returned to II with probability 20%.

(a) If the trucks are initially distributed with 40% at location I, 25% at location II, and 35% at location III, find the distribution on the second and third days.

(b) If a truck is rented at location II, find the probability for each location that it will be at that location after three days.

A particle can be in two states, zero and one. It can leave state zero and enter state one with probability $3/4$. If it enters state one it deterministically (with probability 1) returns to state zero. Find the probability that the particle will be in state zero at time 3 if it started in state zero with probability $1/3$ at time 0.