

# HW6

Problem 4

$$\begin{aligned} 0-1 &\rightarrow 0.95 \\ 1-2 &\rightarrow 0.97 \\ 2-3 &\rightarrow 0.9 \end{aligned}$$

$$\begin{aligned} 0 &\rightarrow 0.1 \\ 1 &\rightarrow 1.2 \\ 2 &\rightarrow 0.9 \\ 3 &\rightarrow 0.1 \end{aligned}$$

$$\begin{aligned} n_0(t) &= 0.1 \cdot n_0(t-1) + 1.2 \cdot n_1(t-1) + 0.9 \cdot n_2(t-2) + 0.1 \cdot n_3(t-3) \\ n_1(t) &= 0.95 n_0(t-1) \\ n_2(t) &= 0.97 n_1(t-1) \\ n_3(t) &= 0.90 n_2(t-1) \end{aligned}$$

$$n_1(t) = 0.95 n_0(t-1)$$

$$n_1(t-1) = 0.95 \cdot 0.97 \cdot n_0(t-2)$$

$$n_2(t) = 0.95 \cdot 0.97 \cdot n_0(t-2)$$

$$n_3(t) = 0.95 \cdot 0.97 \cdot 0.9 \cdot n_0(t-3)$$

$$n_0(t) = 0.1 \cdot n_0(t-1) + 1.2 \cdot 0.95 n_0(t-1) + 0.9 \cdot 0.97 n_0(t-2) + 0.1 \cdot 0.9 n_0(t-3)$$

$$n_0(t) = 0.1 \cdot n_0(t-1) + 1.14 n_0(t-1) + 0.873 n_0(t-2) + 0.09 n_0(t-3)$$

$$\boxed{\text{REC}} = [0.1, 1.14, 0.873, 0.09 \dots]$$

Problem 2

Leslie  
matrix

$$\begin{bmatrix} h_0(t) \\ h_1(t) \\ h_2(t) \\ h_3(t) \end{bmatrix} = \begin{bmatrix} 0.1 & 1.2 & 0.9 & 0.1 \\ 0.95 & 0 & 0 & 0 \\ 0 & 0.97 & 0 & 0 \\ 0 & 0 & 0.9 & 0 \end{bmatrix} \begin{bmatrix} h_0(t-1) \\ h_1(t-1) \\ h_2(t-1) \\ h_3(t-1) \end{bmatrix}$$

Problem 3

Transition Matrix

$$\begin{bmatrix} P_{11} & P_{12} & P_{13} & P_{14} \\ P_{21} & & & \\ P_{31} & & & \\ P_{41} & \dots & \dots & P_{44} \end{bmatrix}$$

$$P = \begin{bmatrix} 0.5 & 0.1667 & 0.1667 & 0.1667 \\ 0.2 & 0.4 & 0.2 & 0.2 \\ 0.233 & 0.233 & 0.3 & 0.233 \\ 0.266 & 0.266 & 0.266 & 0.2 \end{bmatrix}$$

ALL Rows  
must = 1