

$$1) a(n) = .1a(n-4) + (.95)(1.2)a(n-3) + (.97)(.9)a(n-2) + .1a(n-1)$$

$$2) \begin{bmatrix} 0.1 & 1.2 & 0.9 & 0.1 \\ .95 & 0 & 0 & 0 \\ 0 & .97 & 0 & 0 \\ 0 & 0 & 0.9 & 0 \end{bmatrix} \begin{bmatrix} n_0(t-1) \\ n_1(t-1) \\ n_2(t-1) \\ n_3(t-1) \end{bmatrix}$$

$$3) P = \begin{bmatrix} 0.5 & .166 & .166 & .166 \\ 0.2 & 0.4 & 0.2 & 0.2 \\ .233 & .233 & 0.3 & .233 \\ .266 & .266 & .266 & 0.2 \end{bmatrix} \begin{bmatrix} S_1 \\ S_2 \\ S_3 \\ S_4 \end{bmatrix} (t-1)$$

$$p^{1000} = \begin{bmatrix} .09 & .075 & .06 & .05 \\ .09 & .07 & .06 & .05 \\ .09 & .07 & .06 & .05 \\ .09 & .07 & .06 & .05 \end{bmatrix}$$

most to least popular: S_1, S_2, S_3, S_4