Math 180B HW2

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PK Exercise 3.1.2

$$\begin{aligned} P(X_2 = 1, X_3 = 1 | X_1 = 0) &= P(X_3 = 1 | X_2 = 1) P(X_1 = 1 | X_1 = 0) \\ &= 0.6 \times 0.2 \\ &= 0.12. \end{aligned}$$

Since we are considering only stationary Markov's Chain,

$$\begin{aligned} P(X_1 = 1, X_2 = 1 | X_0 = 0) &= P(X_3 = 1 | X_2 = 1) P(X_1 = 1 | X_1 = 0) \\ &= 0.12. \end{aligned}$$

PK Problem 3.1.1

$$P = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ 1 & 0.96 & 0.04 & 0 & 0 & 0 \\ 2 & 0 & 0.94 & 0.06 & 0 & 0 \\ 3 & 0 & 0 & 0.94 & 0.06 & 0 \\ 4 & 0 & 0 & 0 & 0.96 & 0.04 \\ 5 & 0 & 0 & 0 & 0 & 1 \end{array}$$

Then, at the end of *n-th* period, the transition matrix is simply P^n.

PK Problem 3.1.2

(a)

$$P(X_0 = 0, X_1 = 0, X_2 = 0) = P_{00} \times P_{00} \times P_{00} = (1 - \alpha)^3.$$

(b)

$$\begin{aligned} P(X_0 = 0, X_1 = 0, X_2 = 0) &= P_{00} \times P_{00} \times P_{01} + P_{00} \times P_{01} \times P_{01} \\ &= (1 - \alpha)^3 + \alpha(1 - \alpha)^2. \end{aligned}$$

PK Exercise 3.2.6

PK Problem 3.2.2

PK Problem 3.3.1