1 Simple First Step Analysis - See Chap 3.4.1

- Idea: analyze the first step and then use LTP + Markov property (M.P.)
- Example: Let \( \{X_n\} \) be a MC with

\[
P = \begin{pmatrix}
1 & 0 & 0 \\
\alpha & \beta & \gamma \\
0 & 0 & 1
\end{pmatrix}
\]

where \( 0 < \alpha, \beta, \gamma < 1 \).

Question:
(1) Probability of absorption in state 0? (\( \frac{\alpha}{\alpha+\gamma} \))
(2) Mean time of absorption? (\( \frac{1}{1-\beta} = \frac{1}{\alpha+\gamma} \))

2 General First Step Analysis - See Chap 3.4.2

- Idea: analyze the first step and then use LTP + Markov property (M.P.)

- Example: Let \( \{X_n\} \) be a MC with finite states: \( 0, \cdots, r - 1 \) to be transient and \( r, \cdots, N \) to be absorbing.

Question:
(1) Distribution of states over absorption?
(2) Mean time of absorption (More generally, \( E[\sum_{n=0}^{T-1} g(X_n)|X_0 = i] \))?