Bob, Alice and Carol are playing frisbee. Bob always throws to Alice and Alice always throws to Carol. Carol throws to Bob 2/3 of the time and to Alice 1/3 of the time.

a) Write the Transition matrix for the situation.

\[ T = \begin{pmatrix}
0 & 0 & 1 \\
1 & 0 & 0 \\
\frac{1}{3} & \frac{2}{3} & 0
\end{pmatrix} \]

b) If Carol has the frisbee now, what is the probability she has it after it has been thrown twice?

\[ T^2 = \begin{pmatrix}
\frac{1}{3} & \frac{2}{3} & 0 \\
0 & 0 & 1 \\
\frac{1}{3} & 0 & \frac{1}{3}
\end{pmatrix} \]

\[ P_{33} = \frac{1}{3} \]

To find the probability that Alice, Bob and Carol have the frisbee initially are 0.2, 0.4, 0.4 respectively, what is the probability Carol has the frisbee after 2 throws?

\[ P_0 = (0.2, 0.4, 0.4) \]

\[ P_2 = P_0 T^2 = (0.2, 0.4, 0.4) \begin{pmatrix}
\frac{1}{3} & \frac{2}{3} & 0 \\
0 & 0 & 1 \\
\frac{2}{3} & 0 & \frac{1}{3}
\end{pmatrix} = \begin{pmatrix}
\frac{1}{3} & \frac{2}{15} & \frac{8}{15}
\end{pmatrix} \]

Prob. Carol has it = 8/15