IME625: Introduction to Stochastic Processes
Quiz-1 Part-1, January 31, 2022

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1. Consider the transition probability matrix to the right. It depicts X_n – the wealth of a player after n rounds in a game of repeated gambling. Consider $X_0 = 2$ to be the starting wealth. The game is deemed to have ended if $X_n = 0$ or 4 for some $n \geq 1$. Ending with 0 means loss and with 4 means win.

p_{ij}	0	1	2	3	4
0	1	0	0	0	0
1	0.4	0	0.6	0	0
2	0	0.4	0	0.6	0
3	0	0	0.4	0	0.6
4	0	0	0	0	1

a) Determine the probability of win by the 5th round. [Marks: 1x5]
b) Given the event in (a), determine the probability that the player did not lose a round.
c) Given that the game ends by the 5th round, determine probability of the event in (b).
d) Given that the game does not end by the 5th round, determine mass function of X_4.
e) Determine the probability that the player is in a better position at the end of 3rd round.

Hint: Think in terms of path and remember that $X_0 = 2$ is known.