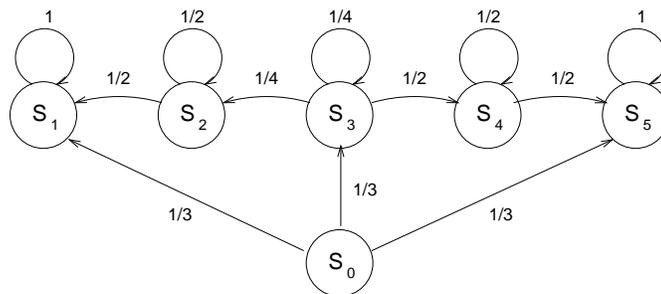


Recitation 18
November 9, 2010

1. There are n fish in a lake, some of which are green and the rest blue. Each day, Helen catches 1 fish. She is equally likely to catch any one of the n fish in the lake. She throws back all the fish, but paints each green fish blue before throwing it back in. Let G_i denote the event that there are i green fish left in the lake.
 - (a) Show how to model this fishing exercise as a Markov chain, where $\{G_i\}$ are the states. Explain why your model satisfies the Markov property.
 - (b) Find the transition probabilities $\{p_{ij}\}$.
 - (c) List the transient and the recurrent states.

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 Drake, Fundamentals of Applied Probability Theory, Problem 5.02.

3. Consider the following Markov chain, with states labelled from s_0, s_1, \dots, s_5 :



Given that the above process is in state s_0 just before the first trial, determine by inspection the probability that:

- (a) The process enters s_2 for the first time as the result of the k th trial.

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- (b) The process never enters s_4 .
- (c) The process enters s_2 and then leaves s_2 on the next trial.
- (d) The process enters s_1 for the first time on the third trial.
- (e) The process is in state s_3 immediately after the n th trial.

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