Department of Applied Mathematics and Statistics
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SEMINAR

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September 8, 2009
304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

ABSORPTION TIMES FOR MARKOV CHAINS

Abstract

A theorem usually attributed to Keilson in the 1970s but dating back at least to Karlin and McGregor (1959) asserts that, for a continuous-time birth-and-death chain on the nonnegative integers started at the origin, the hitting time of any given state is distributed as the convolution of exponential distributions. Until now, the only known proofs were analytic, with no identification of individual exponential random variables summing to the hitting time.

Intertwinings of Markov semigroups (I'll explain what these are) and related ideas will be used to give a simple representation of a birth-and-death hitting time as a sum of independent exponential random variables. I will also discuss extensions to upward-skip-free chains (which can move down arbitrarily but up only one integer at a time) and beyond, to general Markov chains.

If time permits, I will discuss connections of this work to the 1983 work of John Kent on occupation times for birth-and-death chains and to the celebrated Ray–Knight theorem expressing the local time of Brownian motion as the sum of two independent two-dimensional Bessel processes.