Michigan Math Club

Thursday at 4pm in the Commons
Free Pizza and Pop

Traffic Lights Forever

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Abstract for 25 March 2010

Suppose a light switch is being turned on and off at random times, averaging once per minute. If the light is initially off and we check its state a long time T later, we expect that the probability of finding it off again is very nearly 1/2, because of the random fluctuations in the switching. As T tends to infinity, does that probability approach 1/2 monotonically? Or does it instead oscillate with increasing T, and if so, with what period? What if the light cycles through three states, like a traffic light, instead of just "on" and "off": Are the probabilities monotonic functions of time, or is there oscillation?   The first part of this talk will describe a standard mathematical model of such random processes, along with the reasoning that underlies this model. The second part will compute the surprising answers to the questions above.