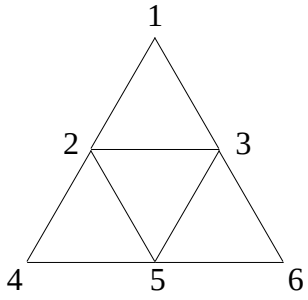
Assignment #3 PY 542 Week of September 15–19, 2008

Reading: For a masterful treatment of non-viscous and viscous hydrodynamics, I highly recommend the Feynman Lectures on Physics, volume II, chapters 40 & 41. This week, we begin the next major chapter of the course on fluctuation phenomena and irreversible processes. Please read chapters 1 & 2 of my book. You may also find chapters IV & V in van Kampen and chapter 15 of Reif helpful; these book are now on reserve.

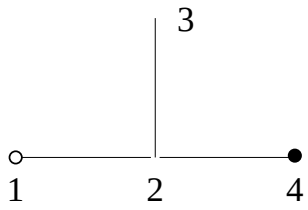
Notes: This week's lectures will be on Tuesday and *Wednesday* from 2–3:30, as I will be traveling on Thursday & Friday. However, I'll hold office hours from 11-1 on Thursday because I don't leave until 1:30.

Problems: Due *Friday* September 26 by 4pm in the mailbox of Andrew Inglis.

1. Consider the Master equation for a first-order Sierpinski gasket shown below. The transition rates between any pair of connected sites equals w. Initially, there is unit probability at site 1. Compute the time dependence of the probability that the random walker is at each site of this system.



2. Consider the Master equation for a particle that hops between the sites of the tree structure shown in the figure. Initially, the particle is at site 1, and the transition rate from any site to any other nearest-neighbor site equals w. However site 4 is "absorbing", that is, when the particle reaches site 4, it remains there forever.



   (a) Compute the time dependence of the probability that the particle is at site 1 and at site 4.

   (b) Compute the average time for a particle to get from site 1 to site 4.

   (c) Suppose now that the rate of hopping $2 \to 3$ equals $r \neq w$. Solve again parts (a) and (b) for this generalization. Give a physical interpretations of your results for the cases $r \ll w$ and $r \gg w$.