

1 Problem set 1, Due November 10

1. Just to make sure you have the definitions in mind: Let B_t be standard Brownian motion and $f(x) = x^3 + e^x$. Compute $df(B_t)$ using the formalism of Itos' formula.
2. Just to make sure you have the definitions in mind, work out an explicit example (as small as you like) of the Cori-Vaquelin-Schaeffer, the Mullin bijection, the hamburger cheeseburger bijection, and the bipolar planar map bijection.
3. Just to make sure you have the definitions in mind, generate a uniform random spanning tree on a small graph (by hand) using coin tosses and Wilson's algorithm.
4. Just to make sure you have the definitions in mind: if you have the range of a stable subordinator of parameter α and the range of another stable subordinator of parameter β , what conditions on β and α ensure the the intersection of these two sets is almost surely empty? Use the Bessel process relationship to explain your answer.
5. Read and take notes on Berestycki's *Introduction to the Gaussian free field and Liouville Quantum Gravity*. (You may also consult *Gaussian free fields for mathematicians* and the introduction to *Liouville quantum gravity and KPZ*.) Try working through some of the exercises.
6. Come talk to me at some point about open problems and/or your final project.

2 Problem set 2, due November 24

1. Read and take notes on *Schramm-Loewner evolution* by Berestycki and Norris. (You may also consult the notes by Lawler, by Kager/Neinhuis, and by Werner on the course web page.) Try working out a few of the things left as exercises.
2. Read and take notes on *one* of the references from the *Selected references on universal object relationships* portion of the webpage (your choice).

3. Read and take notes on one of the papers about growth models (your choice).
4. Come talk to me at some point about open problems and/or your final project.

3 Final Project, due last day of class, Dec. 10

Also, talk to me some time about open problems and/or the final project.