20.181 Checkup 3 reviewsheet

Things to review for checkup 3:

1. Why do we bother doing stochastic simulations ?

   (When are they appropriate? What are the benefits and drawbacks?)

2. What kind of assumptions do we make when we use this kind of description of a system? (contrast to the assumptions made in an ordinary differential equation description of a system)
3. How do you convert from a macroscopic rate constant to a microscopic c-value ? What other information do you need about the system?
4. You have the rxn A+B -> C and at some instant in time t_0 you have 3 molecules of A, 2 of B, and 2 of C, and the c-value for the reaction is 1 per molecule per second.
    1. What is the propensity for the reaction?
    2. What if you have 20 molecules of C?

   Answer the question 4.1 above if the reaction is B+B -> C

5. Why do you use random numbers to when deciding which reaction will fire in the Gillespie algorithm (direct, first and next reaction methods)? Why not just choose the reaction with the highest propensity ?
6. What was Gibson's insight into speeding up the Gillespie algorithm? Does this remind you of methods we've used before in the course to speed up our algorithms ?