Laboratory 8: Exploring Simulation Tools: Excel, AgentCubes, NetLogo

1. Using dart-throwing simulation to find "area under the curve" (compute definite integrals): http://webs.wofford.edu/panoffrm/COSC150/Darts.xlsx

    a. To "throw a dart," pick random x, y in the appropriate range
    b. If y < f(x), the dart is "under the curve" and is a "hit"
    c. Compute the ratio of hits/throws
    d. Calculate a reference area
    e. Use the reference area and ratio to estimate the "area under the curve."

    Examples:

    a. Find the area of a "quarter unit circle" f(x) = sqrt(1-x^2)
    b. Find the area under the curve f(x) = x^2 in the range 0 to 1
    c. Find the area under the curve f(x) = sin(x) in the range 0 to 1

    How would you change your dart simulation for an X-range of 0 to 2 for b and c?

2. Turning Stories to Code
    a. In modern scientific investigations, simulations are used to explore possible scenarios and to provide evidence for various conjectures and hypotheses. The start for many of these simulations is a well-told story with NOUNS, ADJECTIVES and VERBS. Write down in your notebook a simple story for how a disease spreads. Compare your story to others in the class based on the discussion.
    b. Once we have agreed on a story which will "anchor" our model, we can use one of several tools to explore how this model can be implemented in a ***dynamic, visual, and interactive*** computing environment.

        AgentCubes: This is the most direct (currently) tool for story→ code

        Go to: agentcubesonline.com
        Username: cosc150
        Password: W0ff0rd!! (NOTE: shared account, do not change!)

        Follow along with the lab instructor to build disease model and variations. TAKE NOTES TO REFER LATER!!

        NetLogo: This is an "easy" coding environment, but you can make coding changes or build your own. To demonstrate, we will use a pre-built example: http://www.shodor.org/talks/ncsi/netlogo/SimplerSick.nlogo

        As written, this is only the original sickness story without recovery.
        How would you change the number of initial sick persons?
        How could you add recovery?