Epidemiological Modeling: Influenza Outbreaks

You will use an on-line computer simulator that will allow you to alter the parameters for various factors that affect the spread of the flu. In addition, you will describe the time course for different sets of parameters.

These parameters are:
> **Initial immunity:** percentage of the population that was already immune to the pathogen before the outbreak occurred
> **Virulence:** How deadly is this pathogen? On a scale from 0.0-0.75, with 0.0 being not deadly at all, 0.75 being 75% of infected individuals die
> **Duration of infection:** How long does the host remain infectious once infected?
> **Rate of transmission:** On average, how many hosts does each infected host newly infect per day? On a scale from 0.1-10.0.

1) Go to http://science.education.nih.gov/supplements/nih1/diseases/activities/activity4.htm

2) The simulator provides you with the number of sick individuals (susceptible), the number of immune individuals (immune) and the total population on each day of a 30-day outbreak. The starting population is 100,000 individuals. For each of the following scenarios, plot the 30-day time course of the number of susceptible, immune, and dead individuals and answer the questions for each scenario.

	Initial Immunity	Virulence	Duration of Infection	Rate of Transmission
A	0%	0%	2 days	1 person/day
B	10%	0%	2 days	1 person/day
C	0%	10%	2 days	1 person/day

For scenario A: *Over 30 days, how many people got sick?*
For scenario B: *How does this time course compare to part A?*
For scenario C: *Do you think this is a bad killer flu outbreak?*

Now adjust the variables to create the following scenarios:

Scenario D. Super flu
Adjust the variables, and determine the epidemiological properties of a non-fatal flu virus that will make the most number of people sick in 30 days then plot the results. Record the initial immunity, virulence, duration and transmission rate parameters.

Scenario E. Super-killer flu
Adjust the variables, and determine the epidemiological properties of flu virus that will kill the most people in 30 days, then plot the results. Record the initial immunity, virulence, duration and transmission rate parameters.