ECE 341 - Homework #12

Markov Chains and Corona Virus. Due Tuesday, June 9th

Please make the subject "ECE 341 HW#12" if submitting homework electronically to Jacob_Glower@yahoo.com (or on blackboard)

Simulate a disease outbreak.

Assume there are four groups of people

- Healthy: not infected yet but can be infected
- Carrier: infeted and can transmit the disease
- Cured: infected and cannot catch the disease again and cannot transmit the disease
- Dead: Cannot catch the disease and cannot transmit the disease

Assume that each person who is a carrier interracts with N other people each day (k).

- The person is selected at random from all people still alive
- If a carrier interracts with a healthy person, the person has an X% chance of being infected

$$\text{New Infections}=(\#\text{infected})(N)\left(\frac{\#\text{healthy}}{\text{total population}}\right)(X)$$

Also assume that each person who is infected has a

- 3% chance of beinc cured (30 day incubation time on average)
- 0.1% chance of dieing

Assume the initial condition is

- 990 healthy people
- 10 carriers
- 0 cured
- 0 dead

1) Simulate the disease spread for 300 days if
   - N = 3 (each person is in close contact with 3 people each day)
   - X = 6% (6% chance of the catching if exposed)

2) Simulate the effect of self isolation:
   - N = 1 (each person interracts with 1/3rd as many people each day)
   - X = 6% (6% chance of the catching if exposed)

3) Simulate the effect of social distancing and wearing masks:
   - N = 3 (each person interracts with 10 people each day)
   - X = 2% (chance of being infected is 1/3rd what it was before)

4) Simulate the effect of both social distancing and wearing masks:
   - N = 1 (each person interracts with 2 people each day)
   - X = 2% (2 chance of being infected is 1/3rd what is was before)