DATA 252 / DATA 551: Homework 8

- This homework is due by April 6, 2020 at the beginning of class. **You need to submit your answers on Moodle in a pdf document**. In addition, there will be a short quiz at the beginning of class, which might contain contents from this homework (including the assigned video), in addition to contents from the most recent lecture.

1. This week, top U.S. government scientists have estimated that coronavirus could kill 100,000 to 240,000 Americans (https://www.nytimes.com/2020/03/31/us/politics/coronavirus-death-toll-united-states.html). One of the models cited is http://covid19.healthdata.org/projections. Play with this website and answer the following questions (since the website is updated daily, you might get slightly different answers depending on which day you are doing this question.)

(1) For the number of deaths per day, what is the projected peak date?

(2) Which date has the most uncertainty in the estimate of deaths per day? What is the range of the estimated deaths on that day?

(3) Browse through the FAQ page (http://www.healthdata.org/covid/faqs). What does the model assume in terms of social distancing? How is the shape of the model decided?

2. Read this article https://fivethirtyeight.com/features/why-its-so-freaking-hard-to-make-a-good-covid-19-m
In your own words (do not just copy and paste from the article), list five reasons that make COVID19 difficult to model.

3. Watch this very cool video on simulating an epidemic: https://www.youtube.com/watch?v=gxAaO2rsdIs (this is the same one that Prof. Kouh mentioned in class) and answer the following questions.

(1) You might have seen the term “SIR model" in many places these days. What does each letter in SIR stand for?

(2) Modeling an epidemic is hard (for all the reasons you’ve listed in Q2), and that’s why simulation can be very useful: we don’t have to estimate all the parameters; we can play with different parameters to see what would happen. For instance, *infection radius* (which depends on the level of engagement with other people) is one of the simulation parameters investigated in the video. What are some other simulation parameters in the video? List at list three.

(3) According to this simulation, what would be the most effective measure to contain the epidemic? Do you think this measure would be difficult to implement? Briefly explain.

(4) Discuss something you find interesting or surprising from this video.