CSE474 - Lab Task 2

1. First, take a look at this code here: https://colab.research.google.com/github/AllenDowney/ModSimPy/blob/master/chapters/chap11.ipynb
2. Now, tweak the values of **β** (=1/tc) and **γ** (=1/tr) and generate the graph of time against infection for eight (8) pairs of these values. Mark the maximum infection moment with a blue dot.
3. Next, read the code in this link carefully: https://colab.research.google.com/github/AllenDowney/ModSimPy/blob/master/chapters/chap13.ipynb
4. Now, generate graph of **β** against fraction of infection for **γ** in {0.2, 0.4, 0.6, 0.8, 1.0}. Likewise, generate graph of **γ** against fraction of infection for **β** in {0.2, 0.4, 0.6, 0.8, 1.0}. See the code in the link to see how to do it.
5. Lastly, imagine you divide the population into four compartments: S, I, R, and V (for vaccinated). If the vaccination rate is **α**, then **δV/δt** should be αS^2, and **δS/δt** should be **-βSI - δV/δt**. Implement this SIR-V model, i.e. SIR model with vaccination. Your code **should not** implement vaccination like this code here: https://colab.research.google.com/github/AllenDowney/ModSimPy/blob/master/chapters/chap12.ipynb

Submit within 8 March, Tuesday, 1:59 PM.
Your code should be well-commented.
The programming language should be Python 3.

Resources you may find of use:

1. Robert M. Grell, A Differential Equations Analysis of Pandemic Disease Spread in an Apocalyptic State. Source: https://dra.american.edu/islandora/object/1112capstones%3A33/datastream/PDF/view
2. Smith and Moore, The SIR Model for Spread of Disease, Duke University. Source: http://www.math-cs.gordon.edu/courses/mat225/projects/p2/duke-sir.pdf
3. David Smith and Lang Moore, "The SIR Model for Spread of Disease," Convergence (December 2004). Source: https://www.maa.org/press/periodicals/loci/joma/the-sir-model-for-spread-of-disease

4. 3Blue1Brown, Playlist: “COVID-19”. Source: https://youtube.com/playlist?list=PLZHQObOWTQDOcxqQ36Vow3TdTRjkdSvT
5. Primer, Video: “Epidemic, Endemic, and Eradication Simulations”. Source: https://www.youtube.com/watch?v=7OLpKqTriio
6. David Randall Miller, “I programmed some creatures. They Evolved.” Source: https://www.youtube.com/watch?v=N3tRFayqVtk