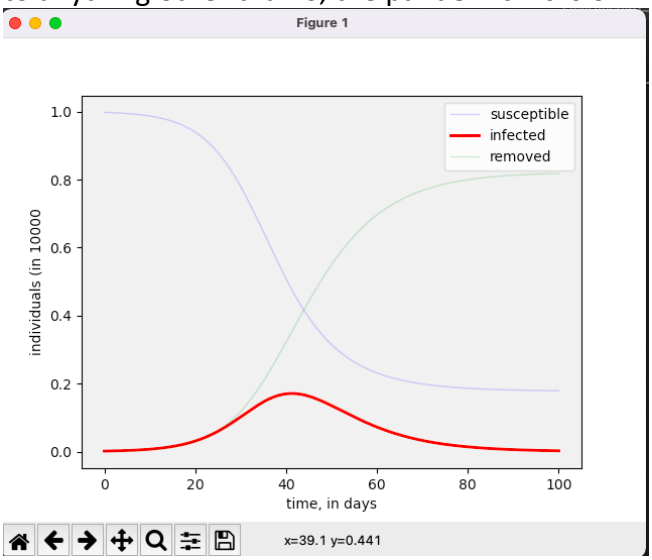
System biology exercise week 14
Tian Xiaoyang 26001904581

Exercise 1
The pandemic doesn't start because there's no infected individual at t=0, so when I0 is changed to anything other than 0, the pandemic kicks off.

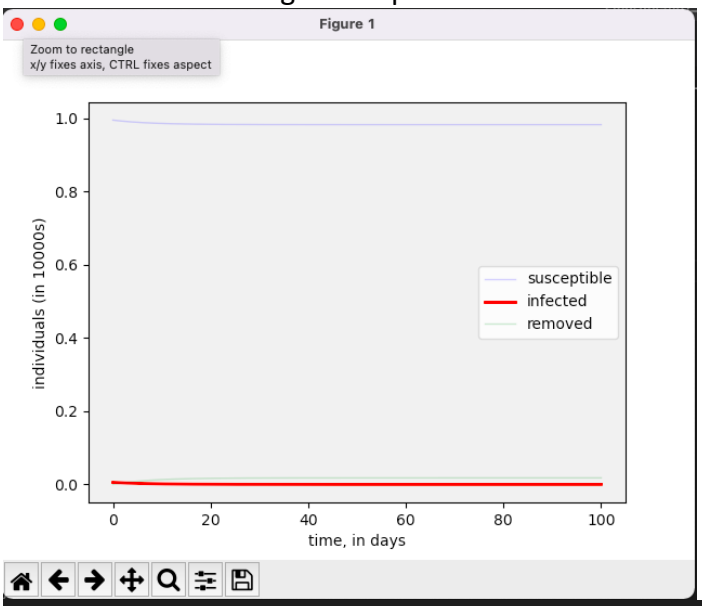



```
# total population
N = 10000
#number of infected at time t=0
I0 = 15
#number of removed (due to immunity or death) at t=0
R0 = 5
#all susceptible individuals at t=0
S0 = N - I0 - R0
```

Exercise 2

When infection period is changed to 3 days

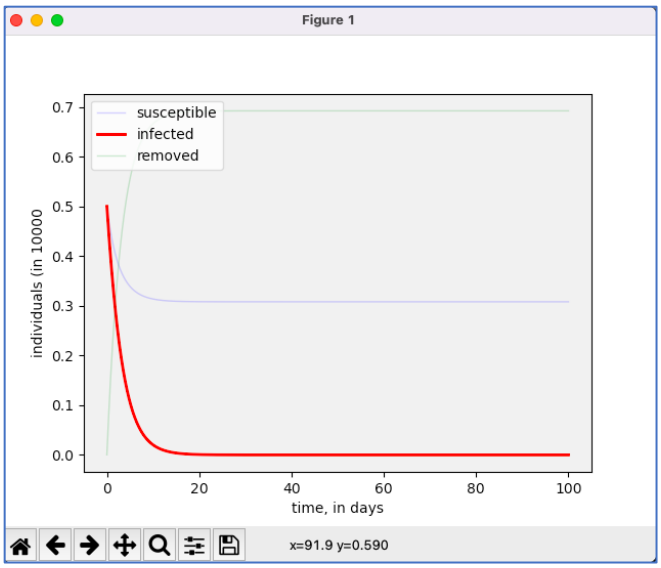
When number of infected is comparatively smaller, all 3 lines are almost flat, low infection rate, low death rate and high susceptible rate.




```
# total population
N = 10000
#number of infected at time t=0
I0 = 55
#number of removed (due to immunity or death) at t=0
R0 = 0
#all susceptible individuals at t=0
S0 = N - I0 - R0
#contact rate
beta = 0.3
# infectious period (inverse of number of days) or recovery time
gamma = float(3/7)
# time from day 0 to day 100 in 1-hour increments
t = np.linspace(0, 100, num=2400)
```

The number of infected only display in a visible manner if the number is initialized with a large value, and the number of infected continues to drop in the simulation.

```
# total population
N = 10000
#number of infected at time t=0
I0 = 5000
#number of removed (due to immunity or death) at t=0
R0 = 2
#all susceptible individuals at t=0
S0 = N - I0 - R0
#contact rate
beta = 0.3
# infectious period (inverse of number of days) or recovery time
gamma = float(3/7)
```



Exercise 3

When the initial infect individuals and the contact rate are set to the following values, this simulation has a peak infected of 1000

```
# total population
N = 10000
#number of infected at time t=0
I0 = 250
#number of removed (due to immunity or death) at t=0
R0 = 0
#all susceptible individuals at t=0
S0 = N - I0 - R0
#contact rate
beta = 0.695
# infectious period (inverse of number of days) or recovery time
gamma = float(3/7)
# time from day 0 to day 100 in 1-hour increments
t = np.linspace(0, 100, num=2400)
```