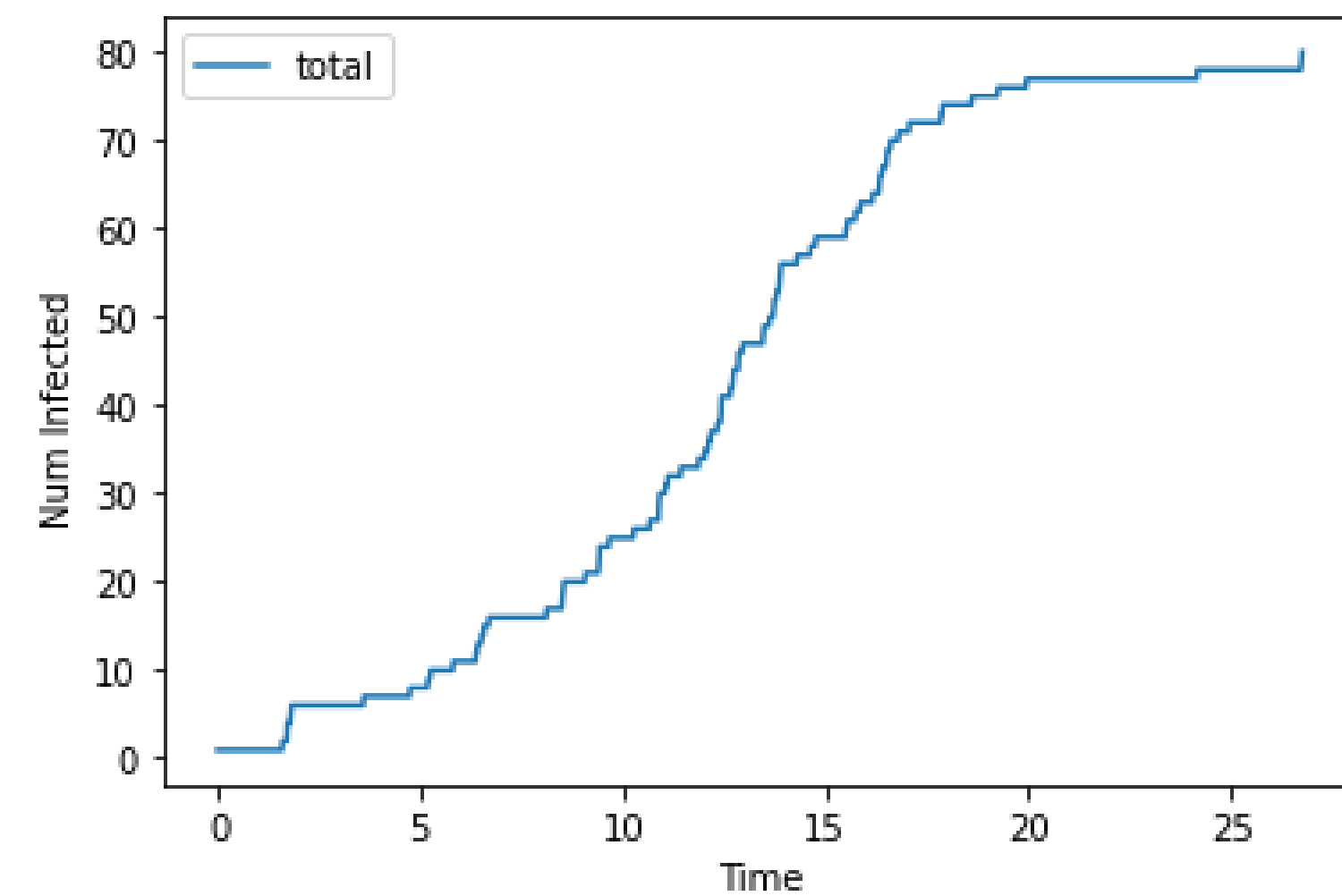


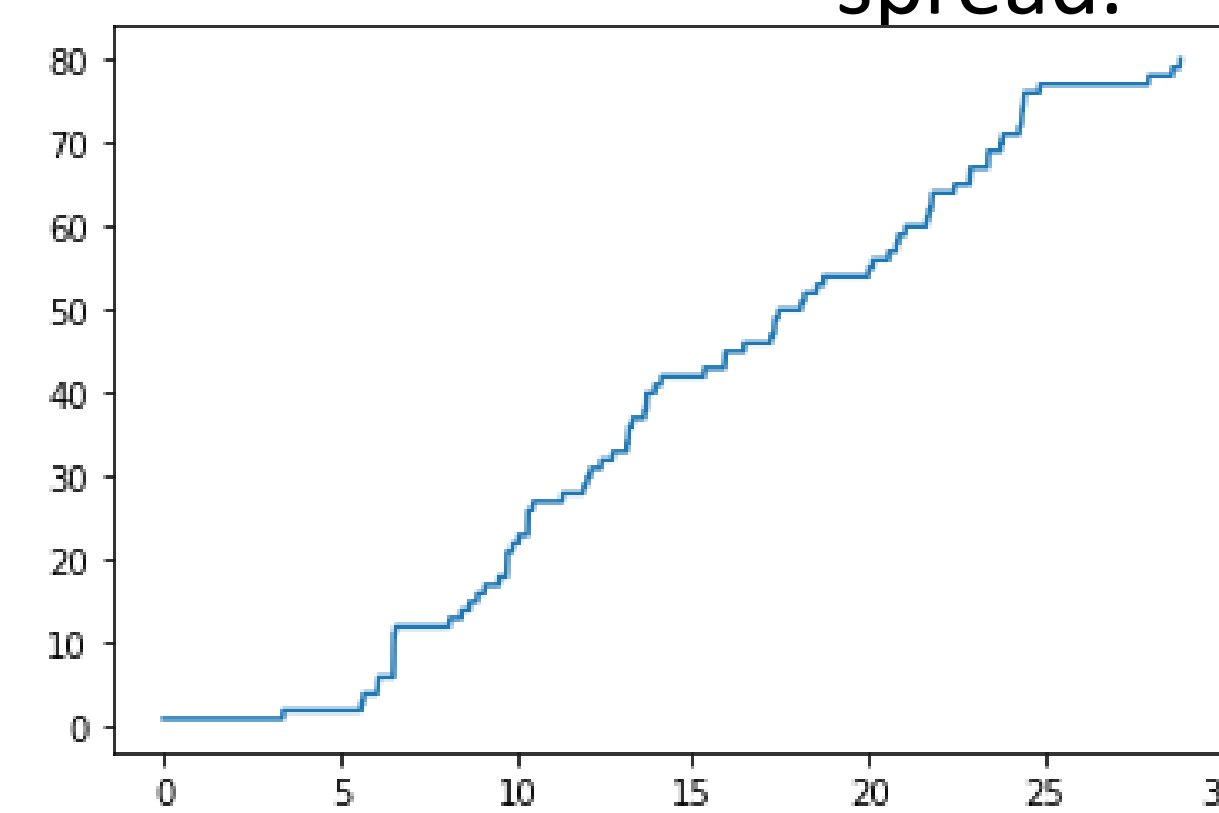
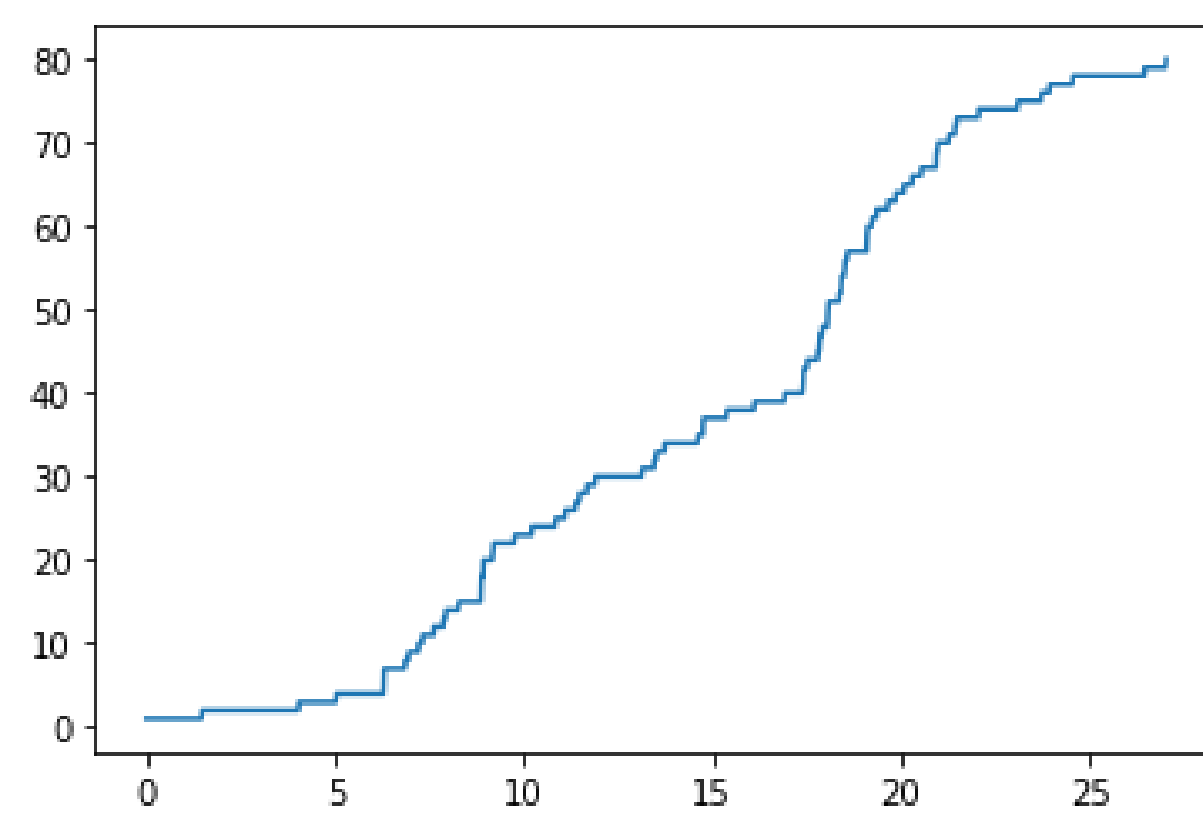
Analysis of Interactions Between People Infected with COVID-19 using Brownian Motion

COVID-19 pandemic has affected lives of many individuals across the world in the past 2 years. Therefore, in our project we simulated spread of the COVID-19 disease using Brownian motion given various initial conditions to understand the potential infection rate better.

In our first run of the algorithm, we set one "person" to be case 0 of the virus and saw how quickly the population would become infected resulting in the log plot below.

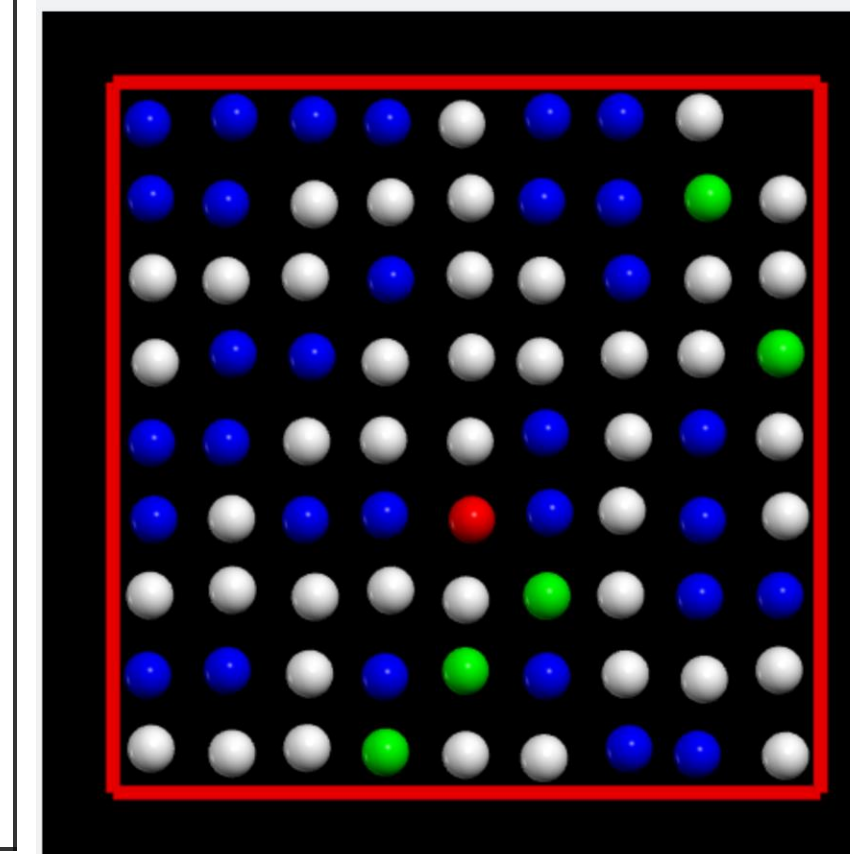
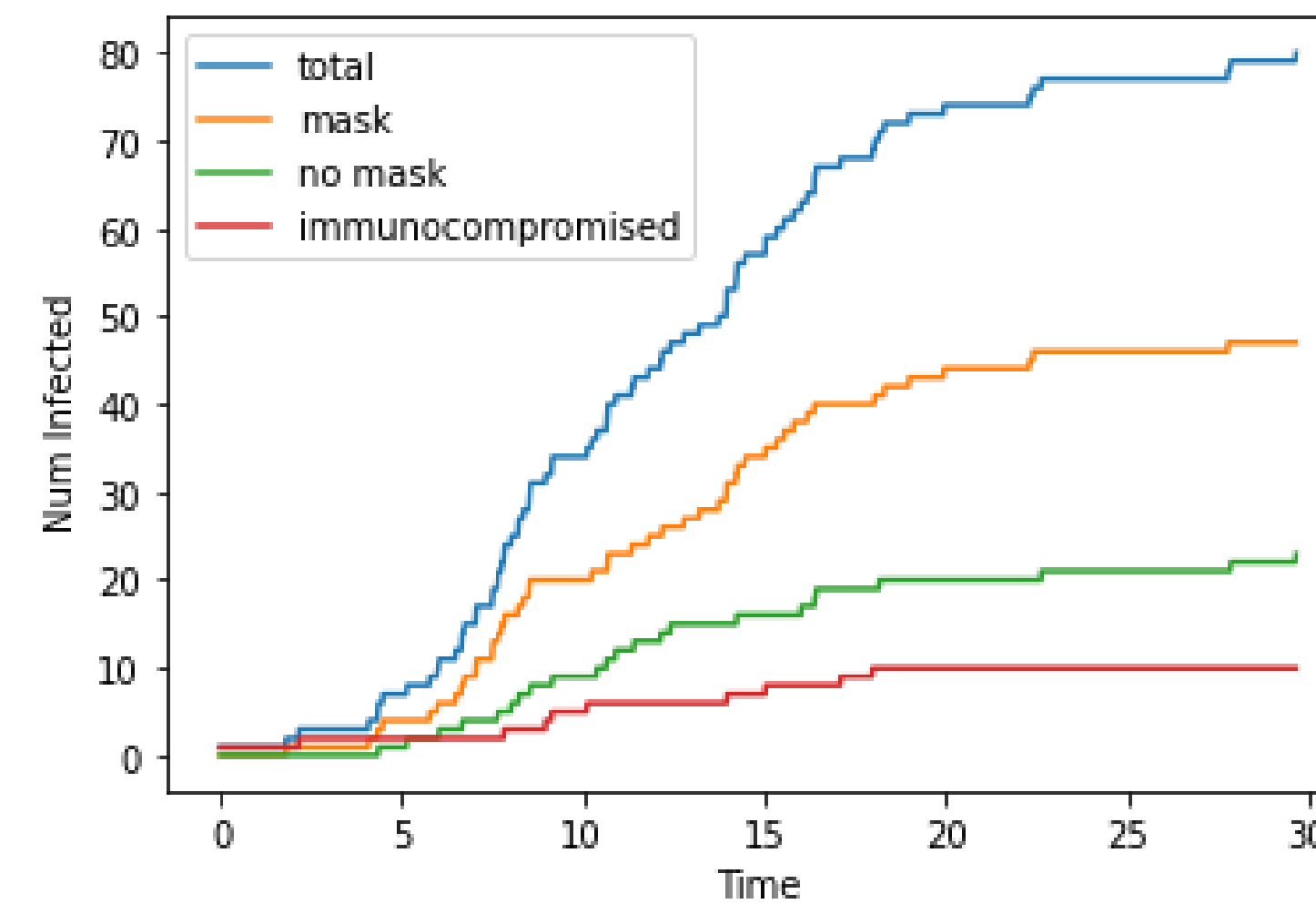


Additionally, we analyzed the different positions of the infected person at the start. We saw that if the person starts at the middle, they will infect initially at a higher rate than if they started close to the wall, but in the long run it takes about the same amount of time to infect everyone.

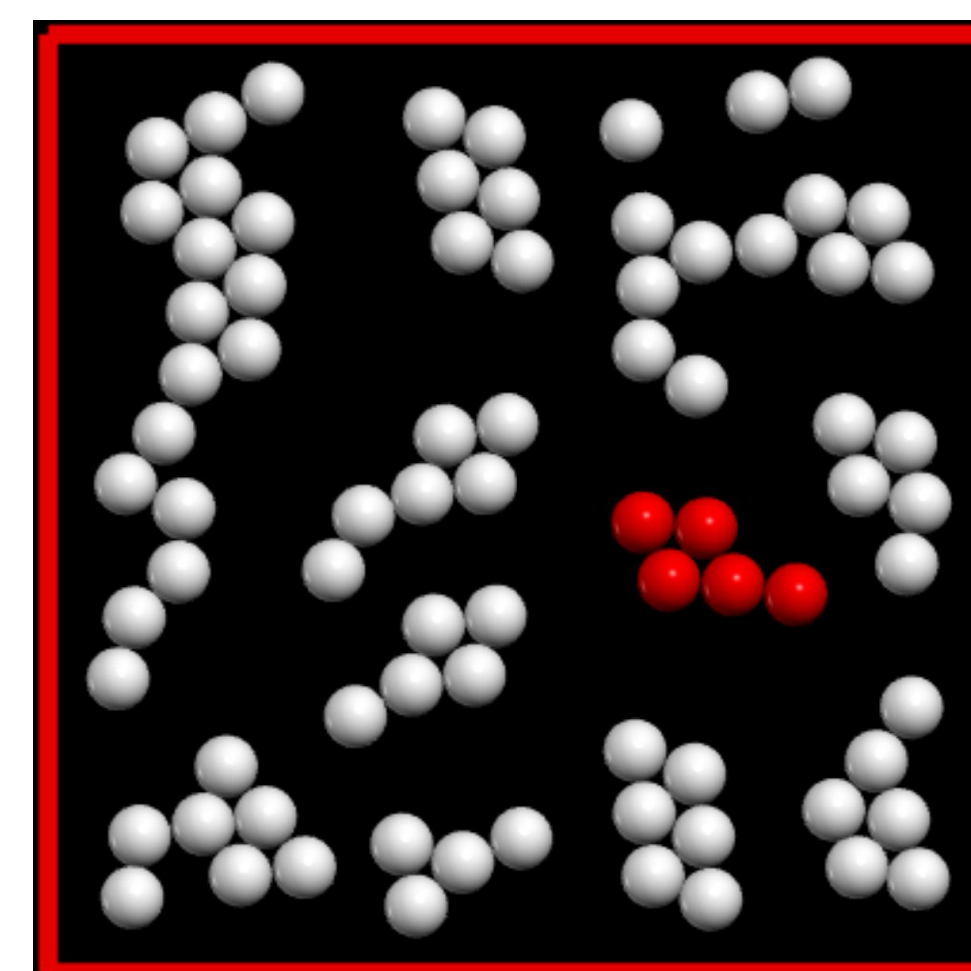


Time it takes to infect everyone when the infected person starts near the wall Time it takes to infect everyone when the infected person starts in the middle

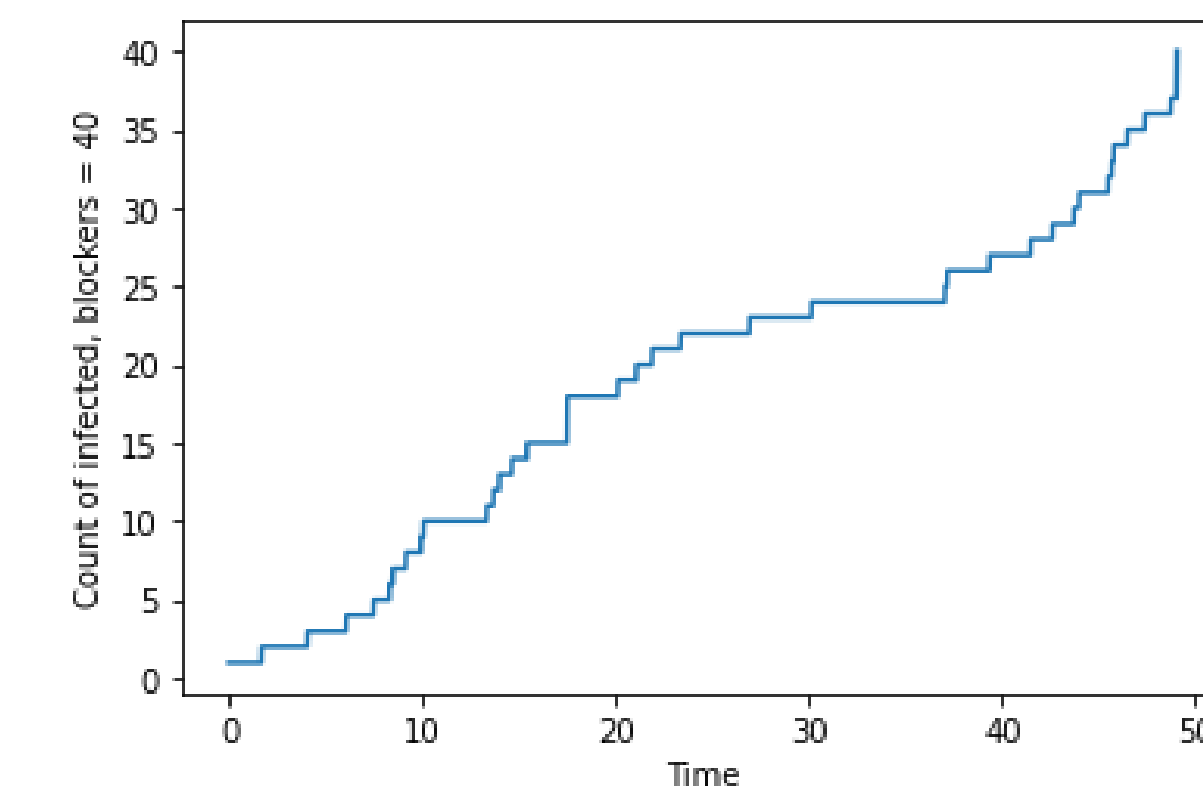
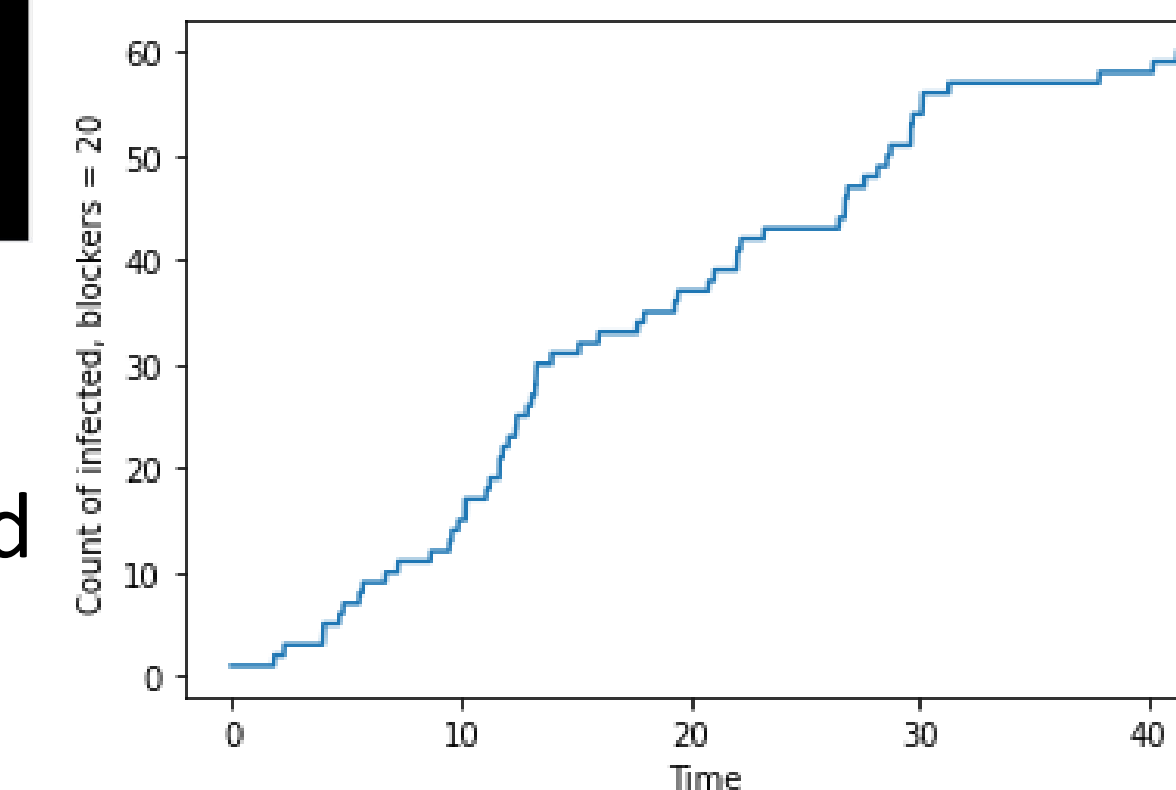
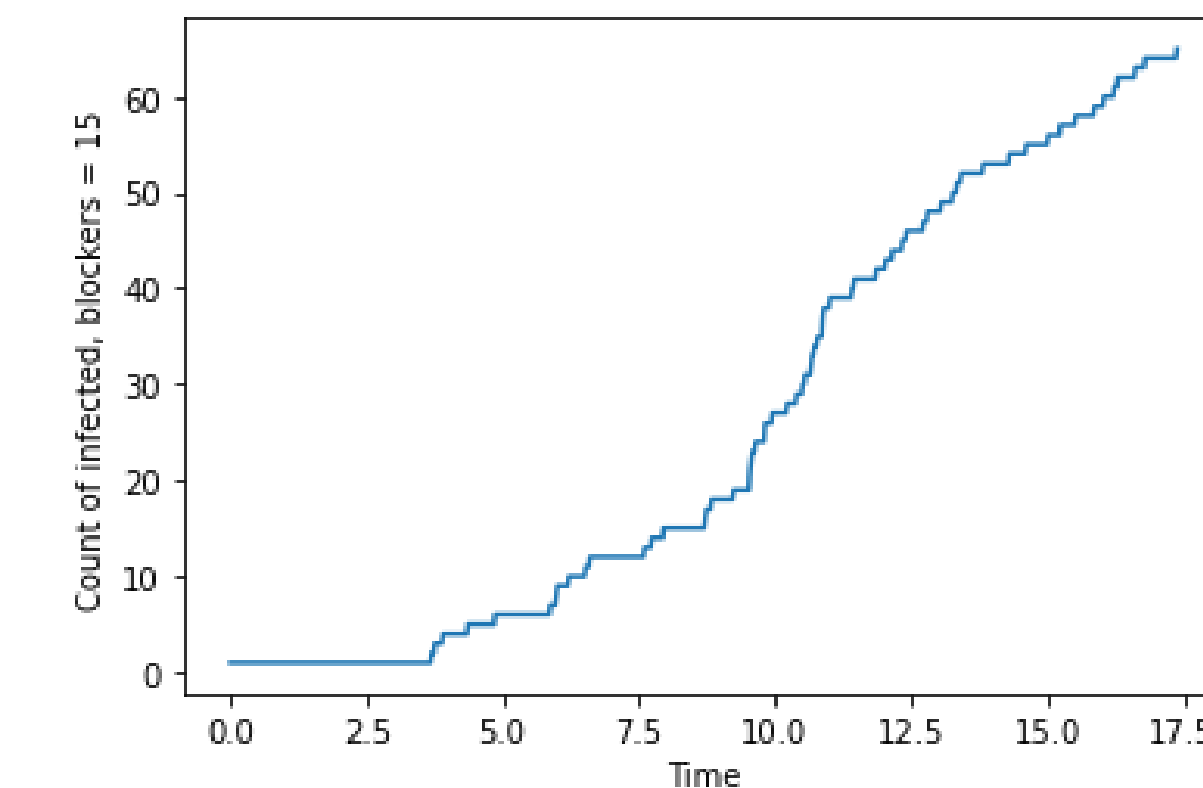
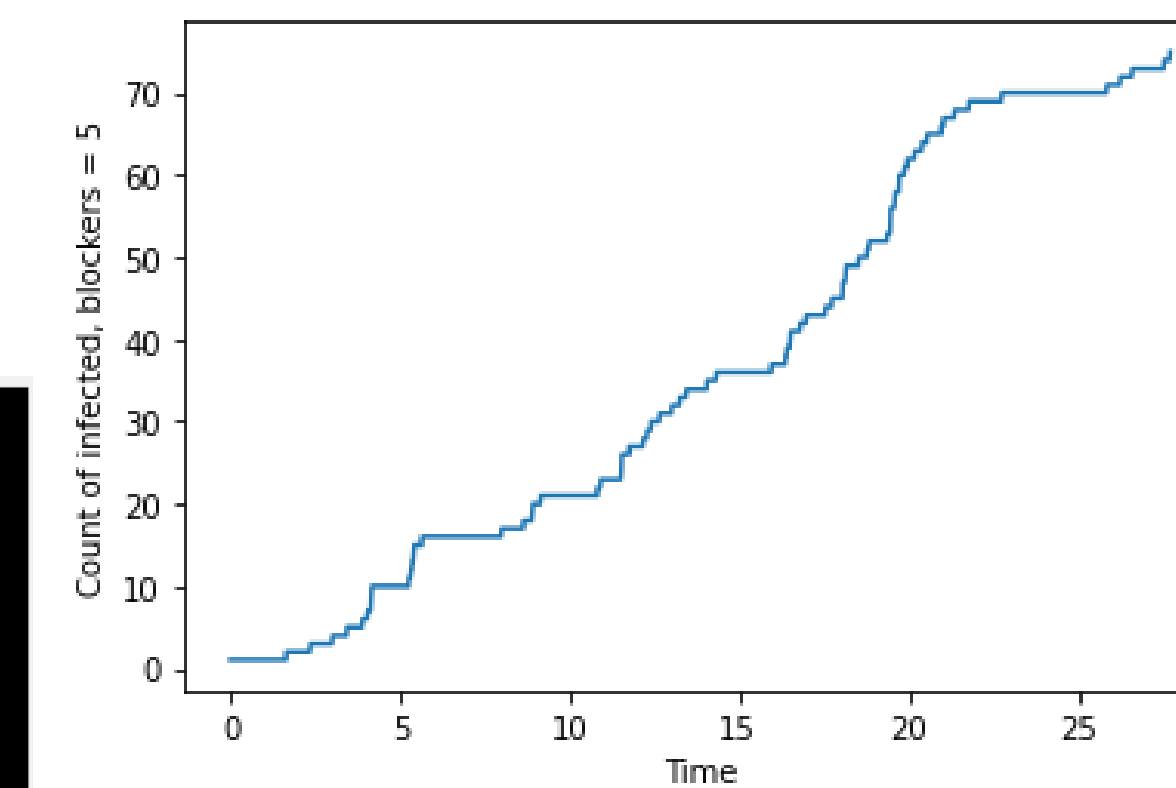
In the second run of our algorithm, we split the molecules into three groups that represent mask wearers, non-mask wearers, and immunocompromised individuals. They are colored white, blue, and green, respectively. On the right we have an image of the original random setup and the resulting graph which shows how certain groups reached 100% infection at a much higher rate than others. It can see that immunocompromised reached 100% much faster than the other groups.



In the third run, we can see how forming closed groups limits the spread of COVID-19. To model this, we changed the forces between the particles by differing their mass. This resulted in the groups seen below and through the simulation we saw that if individuals from the infected group do not interact with other groups, they limit the spread.



We performed analysis to visualize the spread of misinformation about COVID-19. We hoped to show the importance of people not spreading fake news. We vary the number of people who we call "blockers" that did not spread misinformation and we can see how the number of blockers affects the spread.



With just 5 people not spreading misinformation, it takes around 30 cycles for it to spread. With 20 blockers, it takes 40, and with 40 blockers, 50. It shows that the more people that do not spread misinformation, the slower it takes for it to reach every single person in the room. We conclude the importance of being the person that stops the chain. The more "blockers" that are present, the less vulnerable the society is to fake news.