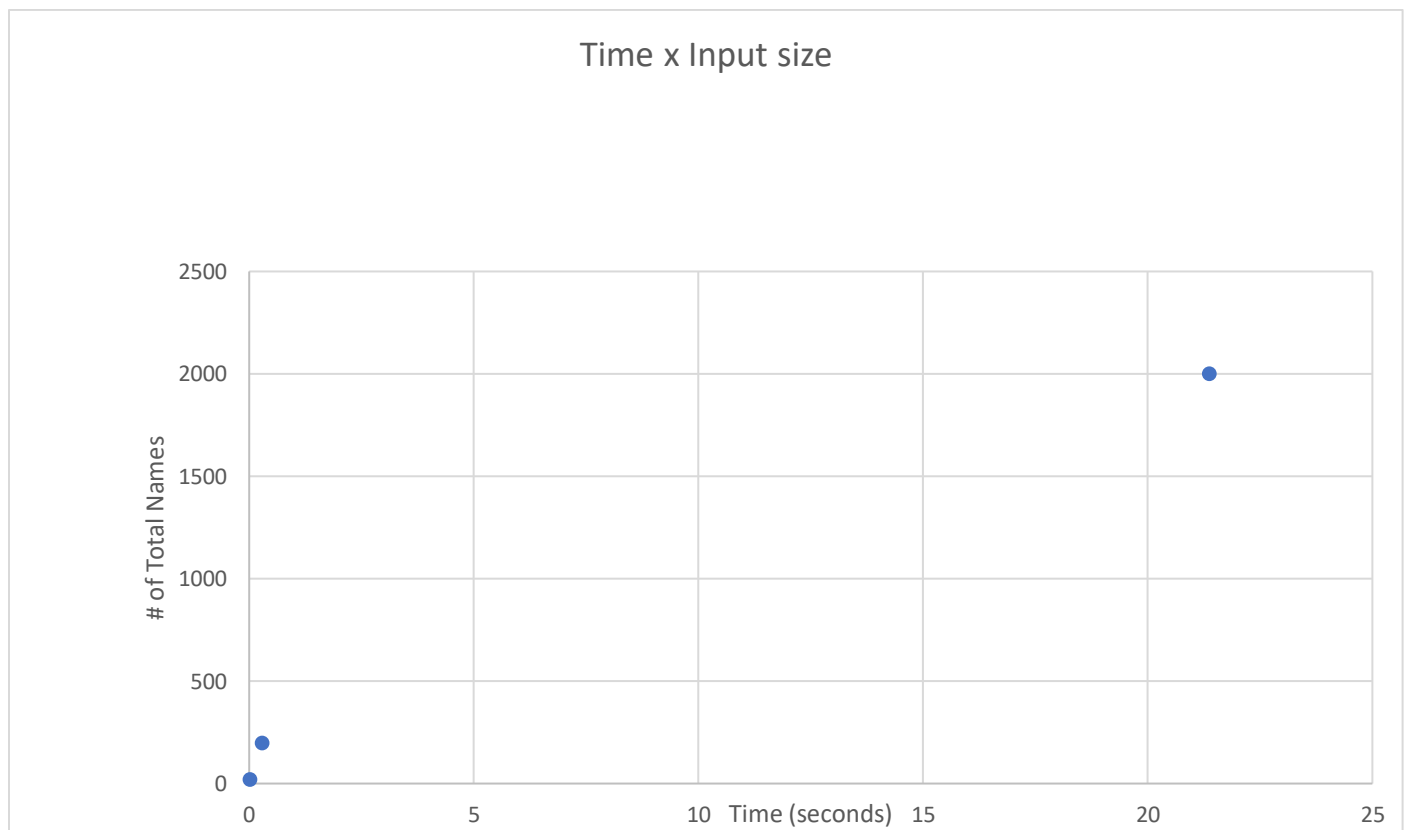


Jake Poretsky & Brendan Tierney

## Benchmarking and Analysis

TIME	TIME2	TIME3	MEAN	Input
0.026714	0.0321167	0.0080063	0.022279	ten
0.3180498	0.2838289	0.2518889	0.2845892	hundred
19.6374887	26.596496	17.8862913	21.37342533	thousand
N/A	N/A	N/A	N/A	5 thousand

\* Did not obtain results for fivethousand.txt after 30 minutes. Test was aborted.



## Coronavirus

1. What is the maximum number of initially infected students such that at least one initially healthy student always remains healthy?

20. Since a healthy student needs to neighbor 2 infected students to become infected, a straight line of healthy students bordering an edge will never be infected

2. What is the minimum number of initially infected students such that there is some arrangement of that many initially infected students will result in every student eventually becoming infected?

5. only 2 infected students are required to infect at least 1 student. Infected students in a line from a corner to the opposite corner will cause all students to be infected.

3. Can you arrange this minimum number of infected students in such a way that the infection never spreads to any healthy student?

The 5 students need to be Not diagonal, but 5 students in a straight line will never infect a healthy student.

4. How would your answers change if there were  $n^2$  students in an  $n \times n$  grid?

1. Max initially infected w/ one healthy =  $n^2 - n$ . line of students bordering edge - the total number of students ( $n^2$ )

2. Min initially infected =  $n$ . A diagonal line from corner to opposite corner is always  $n$ .

3.  $n$  students in a straight line. A straight line of consecutive infected students who is always  $n$

5. Does it matter if  $n$  is even or odd?

We could not uncover any examples to suggest that it matters whether  $n$  is even or odd.

6. What property about the set of infected students never changes as the days pass and the infection spreads?

The perimeter of the infected region never passes the furthest infected students on any side.