1. First, we learned that the maximum number of initially infected students such that at least one initially healthy student always remains healthy was going to be between 3 and 8 because of the two examples that were given shown that if we picked 3 infected students, then we are guaranteed at least 16 students to not be infected. We also came to find out that if 8 infected students were placed in a 5 by 5 grid, then sadly all students would be infected. So we started testing different inputs into the matrix and found that the way most students get infected is if we initially placed each infected student diagonally. For example, if we placed 3 infected students diagonally in a 5 by 5 grid, we would produce a 3 by 3 grid of infected students. The same goes for 4 infected students placed diagonally, then we are guaranteed the most to have a 4 by 4 grid of infected students. Sadly, we can not place 5 infected students diagonally because then the whole grid will be infected. Finally, to answer the question, the maximum number of initially infected students such that at least one healthy student always remains healthy is 4 infected students.
2. As mentioned above, if we placed infected students diagonally, this gives us the highest probability of students being infected. For example, if we placed 3 infected students diagonally in a 5 by 5 grid, we would produce a 3 by 3 grid of infected students. The same goes for 4 infected students placed diagonally, then we are guaranteed the most to have a 4 by 4 grid of infected students. The minimum of initially infected students such that eventually every student becomes infected is 5.
3. If the infected students are all placed vertically or horizontally, then all the other students won’t be infected.
4. The minimum number of initially infected students such that every student becomes infected is n and the maximum number of initially infected students such that at least one initially healthy student always remains healthy is n – 1.
5. It wouldn’t matter if n was even or odd because it was proved in question 1.