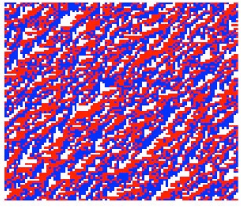
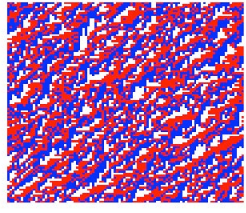
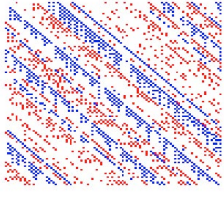
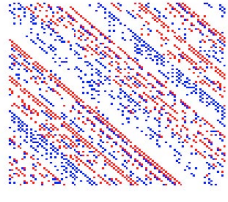
Question 1:
I run simulation on 100*100 grid for at most 2000 times. For density = 0.8, everytime I run, I find traffic jams.



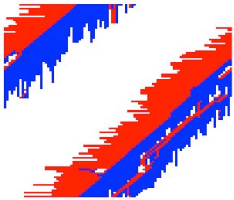


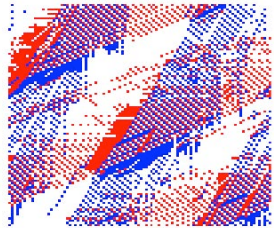
For the same grid, when I run with density of 0.2, I get all free traffic. I run 5 times.





For 100*100 grid, I run with density of 0.41 9 times. I get gridlock for 6 times and free traffic after 200 iterations 3 times. When I run with density of 0.40 9 times. I get gridlock 6 times and free traffic 3 times.





Question 2:
I run the simulation up to 2000 iterations. The number of steps are different according to differnt density. With high density like 0.8, simulation usually stops at steps <= 100, (63,48,43,68,67). With low density like 0.2, simulation ends until it runs out of 2000 iterations. For density near 0.4, it varies. When I hit gridlock, it takes around 500-1000 steps. (478, 799, 1279, 620.....more detail saved in simulation.R)

Question 3:
The transition depends on size: When I run on grid 5*5 with density 0.4, I get all free traffic, but I get more than half of gridlocks for 100*100 grid. (5*5 and 100*100 share the same shape but different size).
The transition depends on shape: When I run on grid 5 * 2000 with density 0.4, I get all free traffic for 9 times, but I get more than half of gridlocks for 100*100 grid. (100*100 and 5*2000 share the same size, but different shape.)

But I have to admit that, the influence of size or shape is not as powerful as density. And my samples are, to some extent, limited and "extreme". Though, we still observe the trend that the cricitcal density and the trasition is changing when I fix density, and size or fix densiy and shape. So, there is dependency among the trasition and size and shape.