Computational Physics Lab 11

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Q1

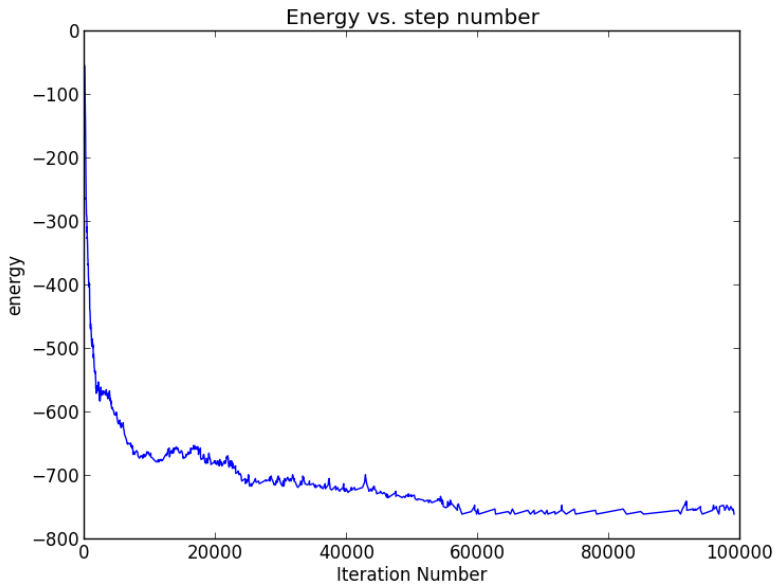

Figure 1: Energy of the spins vs. step number. As we increase the number of iteration, the energy goes to a lower value so that it minimizes the energy of the system.

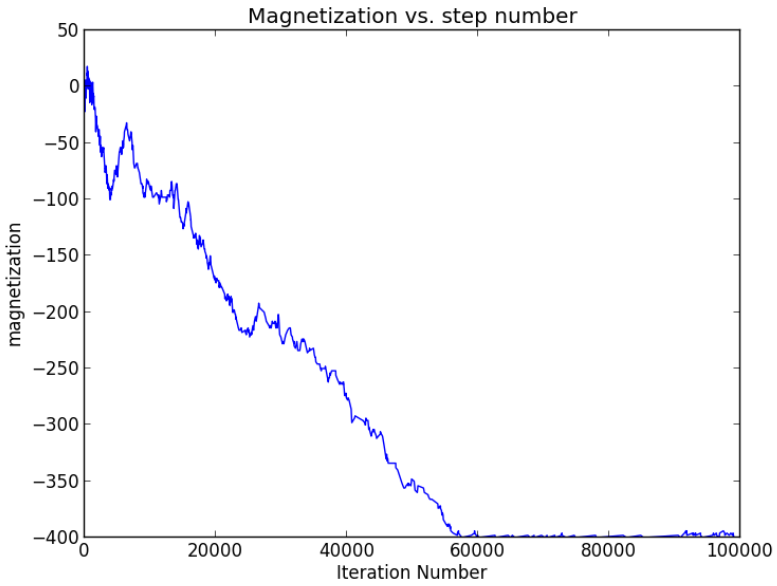

Figure 2: Magnetization of the spins. It starts with a number close to zero since there is a uniform probability for getting spin up and spin down, so the ration is almost the same. Then all the spins are magnetized either to spin 1 or spin -1.

Q2

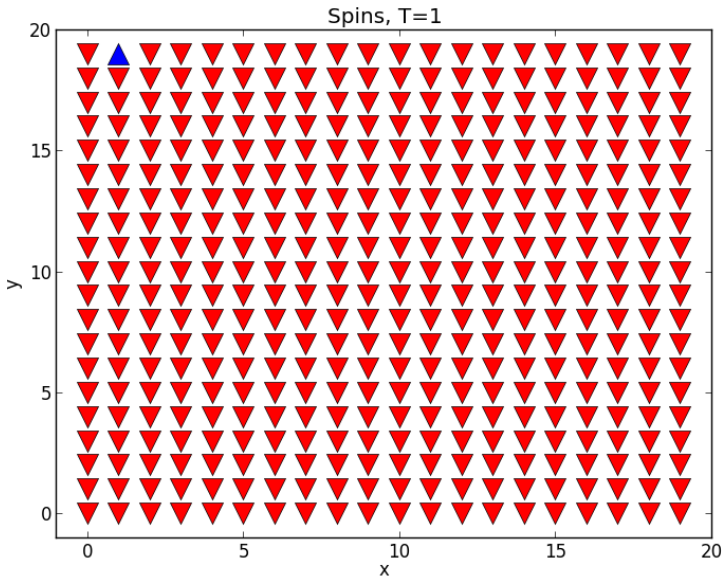

Figure 3: T=1.0

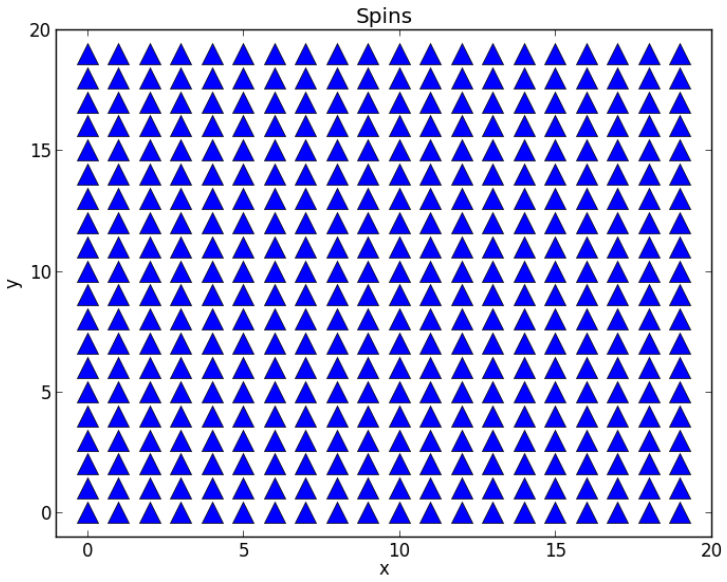

Figure 4: T=1.0

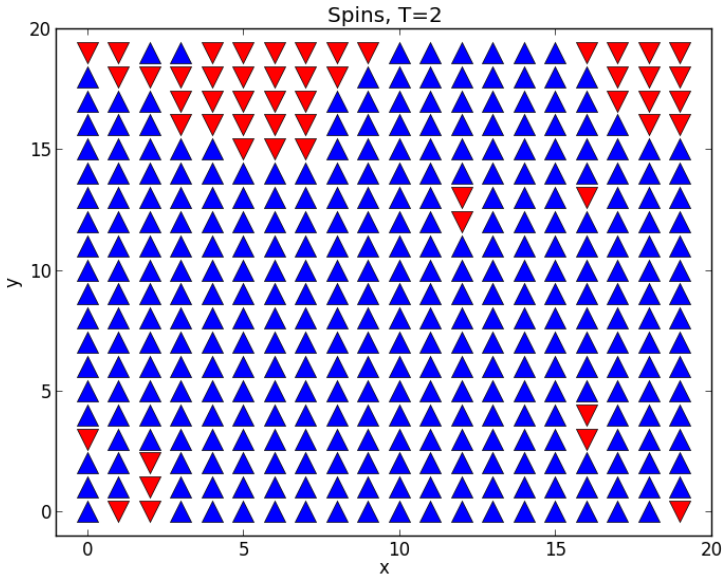

Figure 5: T=2.0

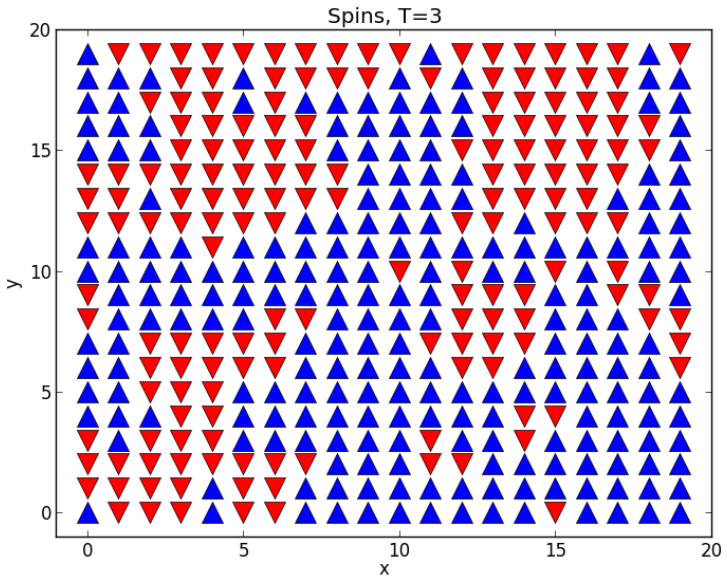

Figure 6: T=3.0

As it is shown in the figures above, as the temperature is increased, there appears more difference in magnetization so there will be less uniform spin direction. In case of T=1 for instance, almost all of the spins are either up or down, whereas in cases T=2 and T=3, there is a combination of both and gets to a combination of the two more with increasing temperature.

Q3

q3.png

Figure 7: