PNS - Assignment 4

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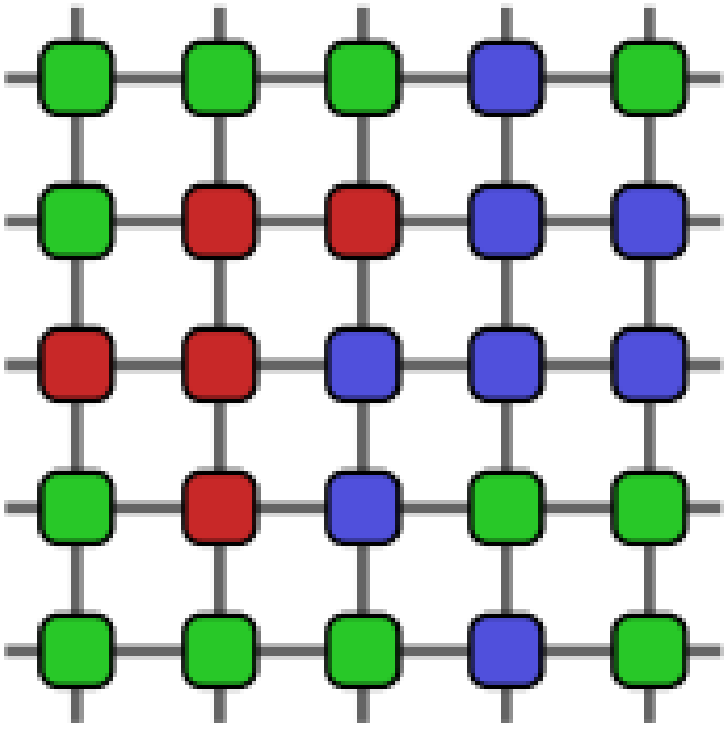
1 Question 1

I have attached A c++ Source code and header file which successfully reproduce The Potts Model in two-dimensions on a 20x20 grid. I used the Markov-Chain method which is based on the Metroplolis algorithm.



A q = 3 Potts spin configuration.

The model describes the thermodynamics of magnetic spins on a two-dimensional crystal lattice and exhibits phase transitions of different orders for different values of the number of states, q.

The fractional magnetisation of a spin configuration $\mathrm{M}(\sigma)[0,1] is$
$\mathrm{M}(\sigma) = \frac{qf(\sigma)-1}{q-1}$

where:
$f(\sigma) = \max_{k=1\ldots q} \frac{1}{L^2} \sum_{x,v} \delta_{k,\sigma_{xy}}$

I found a Value of $< M >$ for this $M(\sigma)$ and plotted it against a range of beta: $\beta \in [0.5, 1.5]$
for both q=3 and q=5. The results were as follows: