

Exercise Sheet #12

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1 Phase transition

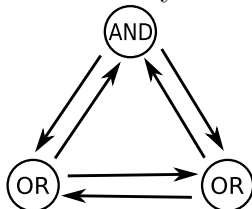
Calculate numerically the phase transition in a random N-K boolean network. Assume a fixed bias $p = \frac{1}{2}$, and calculate the dynamics of the overlap $a(t)$ for a small perturbation with different K values.

- For different values $K = 1, 2, 3$, initialize a network with N nodes and select a random coupling function with random inputs for each node.
- Calculate the change in overlap $a(t)$ over time for a small perturbation. Plot the average overlap $\langle a(t) \rangle$ after using several different initial conditions.
- Find an exponential fit to these plots when applicable. Compare this to the result derived in class.

Attach the code you have written to your results.

2 Asynchronous updating

Consider the dynamics of the following three-site network:



under sequential asynchronous updating. At every time step first update σ_1 then σ_2 and then σ_3 . Determine the full network dynamics, find all cycles and fixed points and compare with the results for synchronous updating.