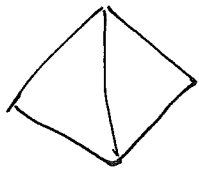


Sample problems for the test ^①

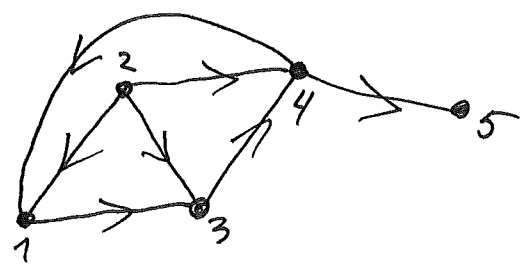
- ① For the Ising model of interacting spins on the cluster



calculate the partition function and plot specific heat vs. temperature ($k_B \equiv 1$).

- ② Build the statistical ensemble of recursive random trees growing under the mechanism of preferential attachment (proportional preference), up to $t=3$. At $t=0$, the graph is an isolated node. Calculate the degree distribution and the distribution and the distribution of the shortest path distances at $t=1, 2, 3$.

3 Calculate the Google PageRanks for the nodes of the directed graph



$p = 0.15$
Compare this result with the approximate formula which neglects correlations.