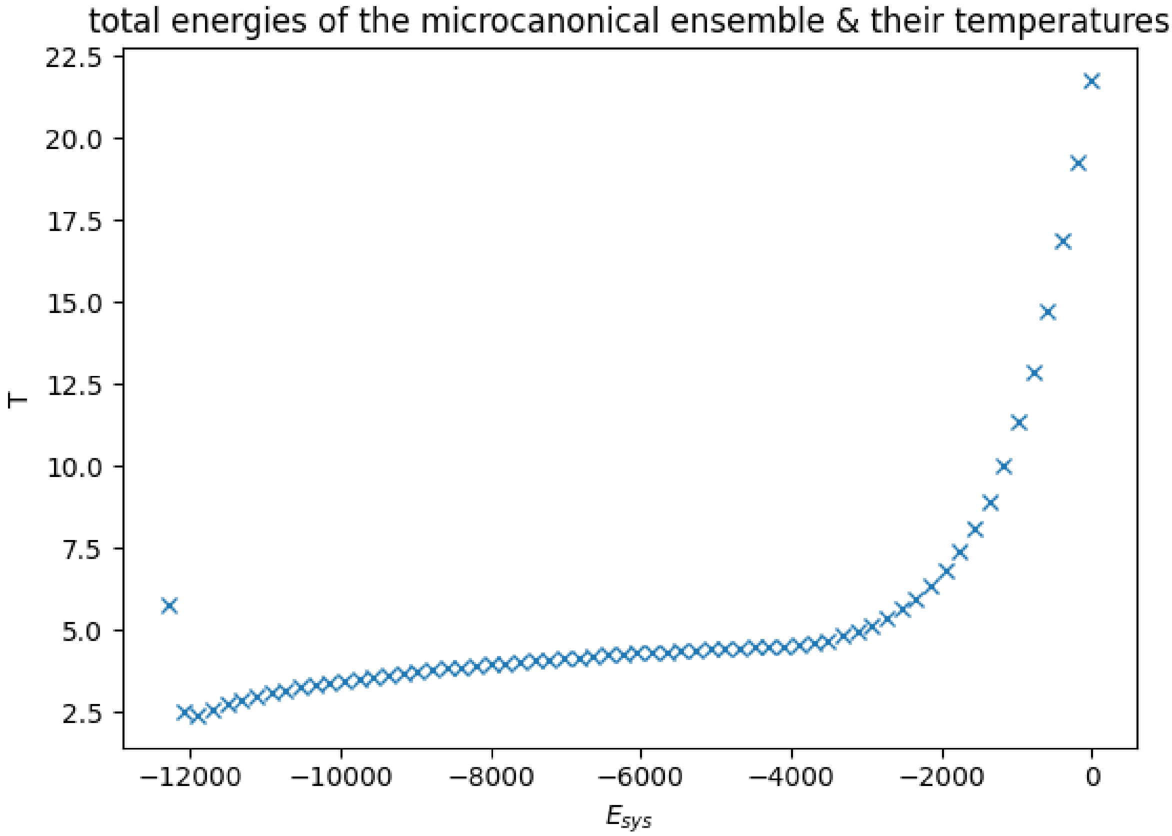
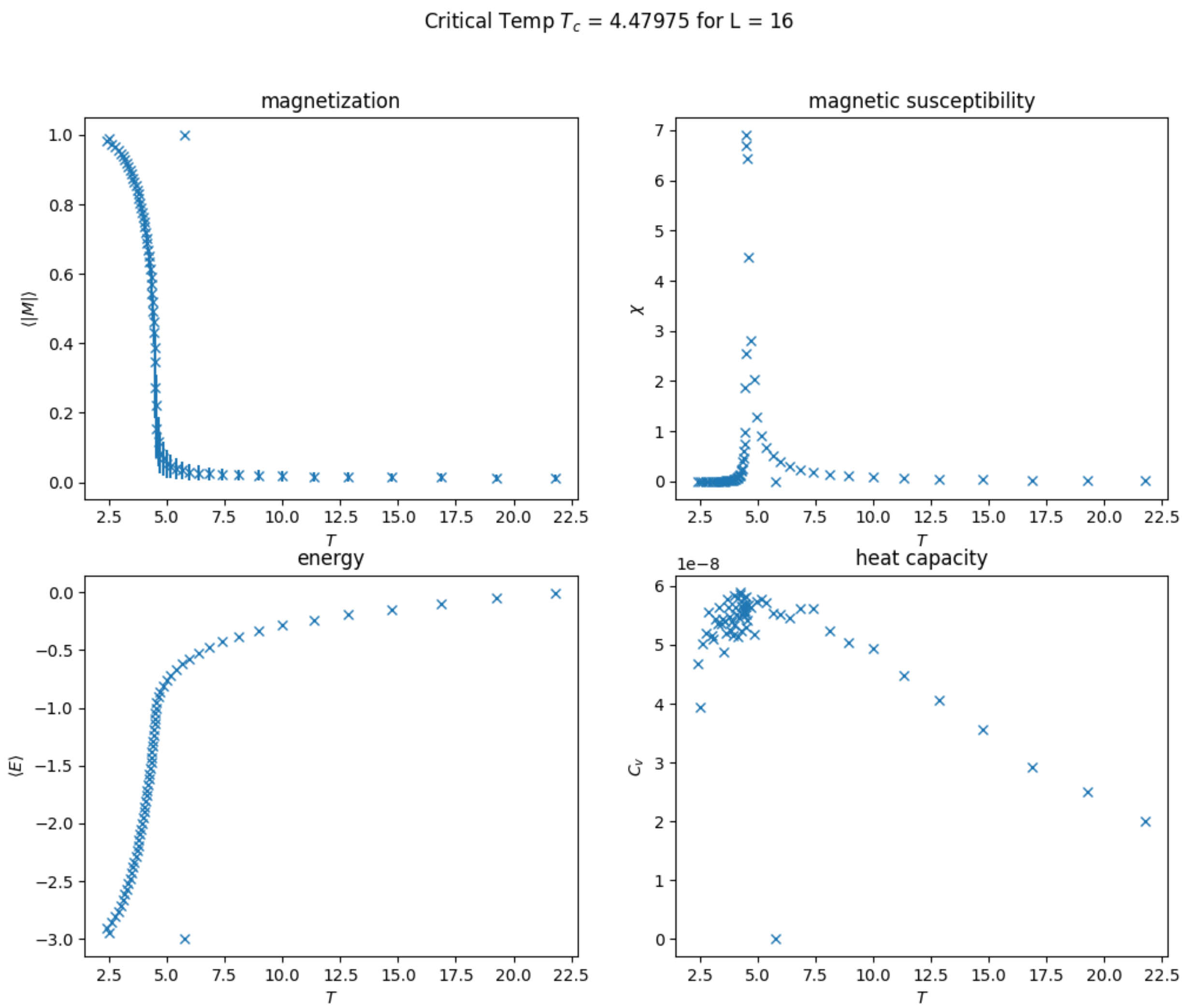
CSP Ex03

How to run: run: “make main” to newly compile the code. To run task1 & task2 run: “source run_task2.sh” and for task3 run: “source run_task3.sh”

Task1: I think my implementation went right. The axis and the critical temperature are on the right place. For task1 I plotted all calculated temperatures for the given total energy of the system. I calculated the T_c using the given formulate from the exercise section. beta = 0.25*log(1 + 4/<E_d>)

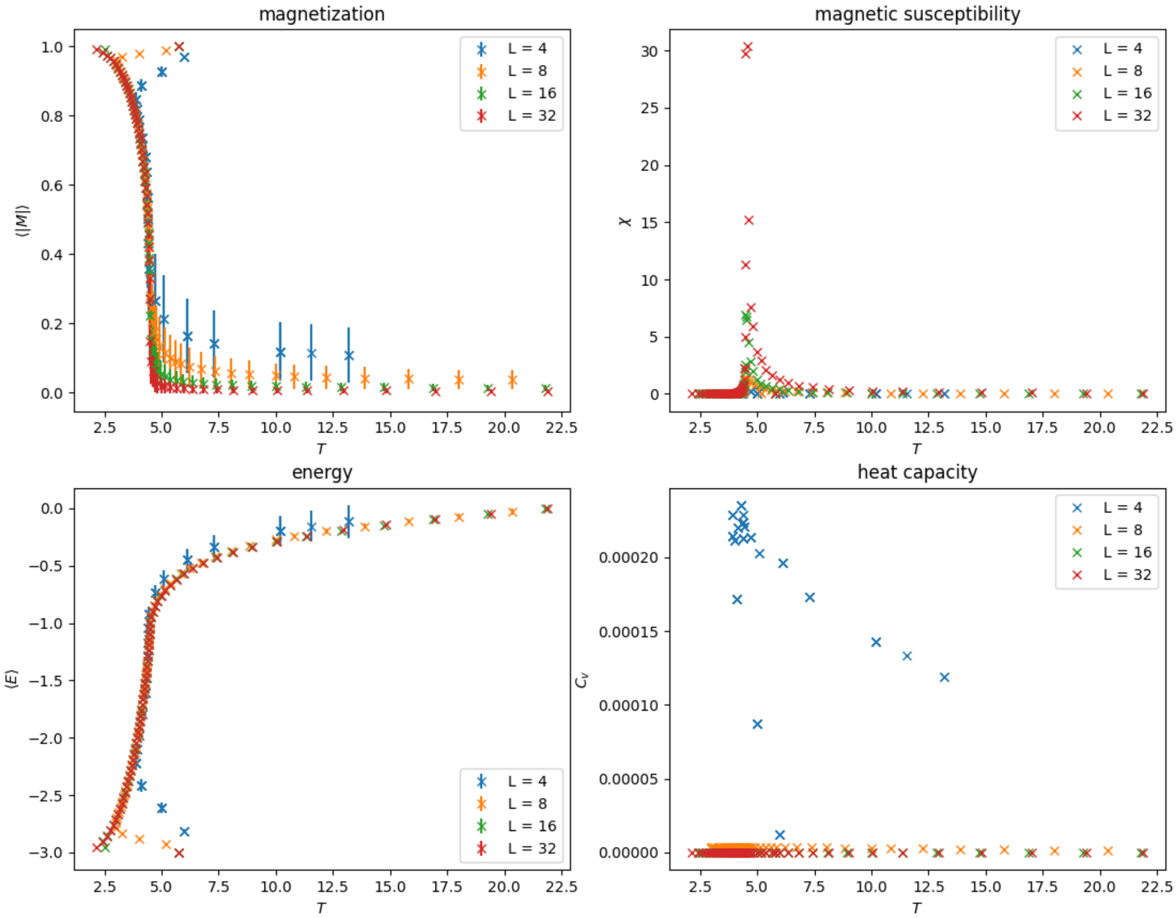


Task2: The result of the plot can be seen below. Surprisingly the microcanonical system is much more accurate and faster compared to the canonical ising model. For a lattice of size L=16 we got a critical temperature T_c = 4.48. The Y-scale for all the plots (except the heat capacity) look acceptable. Somehow (doesn’t matter the size of L) heat capacity does not look well. Idk why.



Task3: Like in the last exercises, the bigger the lattice size the more accurate it gets. I like the way that this time we don't have a thermalization but energising setup. This is more reliable and there is no need to calculate the correlation function (right?). Here are the critical temperature for each system size (calc at the argmax of the magnetic susceptibility)::

Critical Temp T_c = 8.14602 for L = 2
Critical Temp T_c = 4.44281 for L = 4
Critical Temp T_c = 4.4996 for L = 8
Critical Temp T_c = 4.47975 for L = 16
Critical Temp T_c = 4.5507 for L = 32



Task4: Looking at the first plot. It looks like it reaches a critical point. If L= inf then T = inf. This means our markov chain can't reach ergodicity?