Exercise 6

Total Points = (7/20), Feel free to clarify things with me (via email/in person)

Question 1 : Bias of C

Although the system is highly correlated for large J's, your system is highly likely to be found in an extremely ferromagnetic state (**all** spins up/down), computing the spatial correlation function at either of these configurations would give you the same result, hence it is not biased. Basically, C tells you how "alike" the spins are, regardless of which way they point. **(0.5/2)**

Question 2 : Value of C for r = 0

Correct, **(1/1)**

Question 3 : Computing C via convolution

So the issue with your code is that you took the FFT wrong. So here, you are dealing with a two-dimensional system, instead of 1D, so you were supposed to take the 2D FFT, instead of flattening it, and then taking the FFT. **(2/5)**

Question 4 : Plot of the autocorrelation functions

Your MH algorithm draws only one random (i,j) per sweep. A sweep is a "sweep" of the lattice, i.e. you ideally have had N**2 draws (or proposals). Also, while computing the correlation function, it would be better to take the average, rather than one configuration. Due to the above error(s), you didn't get the results. **(1.5/5)**

Question 5 : Autocorrelation time

Missing **(0/5)**

Question 6 : Dynamical exponent

Correct **(2/2)**