High temperature series for 2D Ising model

1. Calculate the first two terms in the high temperature series for the 2D Ising model

\[ H = -J \sum_{\langle ij \rangle} \sigma_i \sigma_j - h \sum_i \sigma_i \]

where the symbol \( \langle ij \rangle \) means \( i \) and \( j \) are nearest neighbors on the square lattice. Your series should be in powers of \( u = \tanh(\beta h) \) and \( v = \tanh(\beta J) \). Be sure that you obtain a term of order \( u^2 v \).

2. Calculate the zero field susceptibility \( \chi \). Interpret your result and compare with your answer in 1D.