2.1 Lab session notes

28/01/2026 note:

Have begun switching from onenote labbook to a quarto document. Still hand copy equations for "Wk0.5 background theory and concept".

29/01/2026 lab log

Turci session; went over Jaynes model mean field theory derivion

catchup w/lab partner; outlined code She summarised lit review:

- cluster definition:
    - useful definition; connected points w/same spin; (domb and stall, link 2)

code plan:

- dataset object
    - list of config objects over temperature
    - save as folder of config objects - give config objects useful names to reconstruct dataset object
- getClusters - returns list of clusters as some sort of data structure (maybe True/False bool array w/spin value?)
- cluster analysis methods:
    - cluster size
    - correlation length?
    - cluster mean position? may not be useful for debugging?
    - cluster spread (standard deviation) - measure of how spread out

cluster selection algorithm outline:

may need two methods; one "find cluster from point" method and one "find all clusters" method

findAllClusters():

- create bool array of "checked" values (True represents cells that haven't been checked yet, False represents cells that have been checked)
- while loop:
    - pick random "True" cell; assign to array indices
    - propagate cluster from cell

    – set "checked values" array position corresponding to new cluster to false

findCluster(cell, config); do as recursive algorithm

checked algorithm idea w/Scarlett; paper (https://journals.aps.org/prl/pdf/10.1103/Phys-RevLett.62.361)