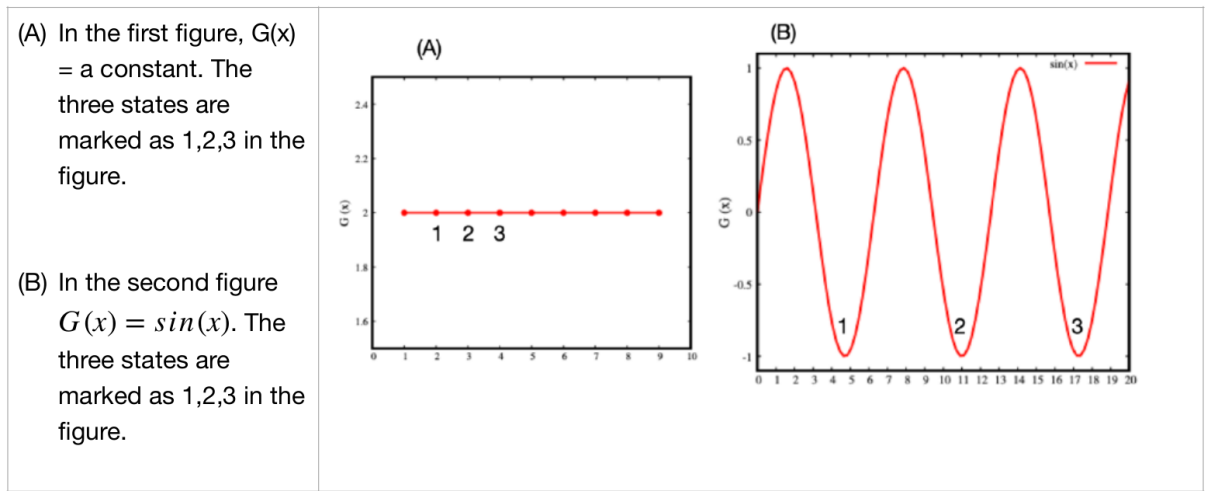


BB-101 Tutorial – 4

Assignment question.

Please write the answer on an A4 sheet and submit it at the END of the tutorial class. Ensure your Roll number and name are on the A4 sheet.

- Consider the two free energy plots shown below. For each case, write an expression for the rate of the movement from state 2 to state 1 (r_{21}) and from state 2 to state 3 (r_{23}). Also, state what is the direction of net movement.



(1+1 Marks)

Tutorial questions:

- In reality, actin monomers can polymerize and depolymerize at both ends of an actin filament. Both the ends are not identical. Let us call one end the plus (+) end and the other the minus (-) end. Consider an actin filament with polymerization and depolymerization at both ends. Let $k_{on}^+ = k_0^+[c]$, k_{off}^+ be the 'on' and 'off' rates on the plus end, and $k_{on}^- = k_0^-[c]$, k_{off}^- be the 'on' and 'off' rate on the negative end, where $[c]$ is the concentration of actin monomers in the solution. The numerical values of the rates are

$$k_0^+ = 11.6(\mu M)^{-1}s^{-1}, k_{off}^+ = 1.4s^{-1}, k_0^- = 1.3(\mu M)^{-1}s^{-1}, k_{off}^- = 0.8s^{-1} \quad (1)$$

- What is the concentration at which the plus end is neither growing nor shrinking on an average? That is, rate of polymerisation and the rate of depolymerisation on the plus end will be equal.

- (b) What is the concentration at which the minus end is neither growing nor shrinking on an average?
- (c) What happens to the polymer when it is at a concentration $[c] = 0.1 \mu M$ and $[c] = 0.9 \mu M$, respectively?
- (d) Find the concentration range at which the actin polymer's plus end will grow and the minus end will shrink.
- (e) What happens when $[c] = 0.3 \mu M$?