Exercises Week 2

Information Theory

1. Consider a discrete source with memory, with the graphical representation given below. The states are defined as follows: $S_1 : s_1s_1$, $S_2 : s_1s_2$, $S_3 : s_2s_1$, $S_4 : s_2s_2$.

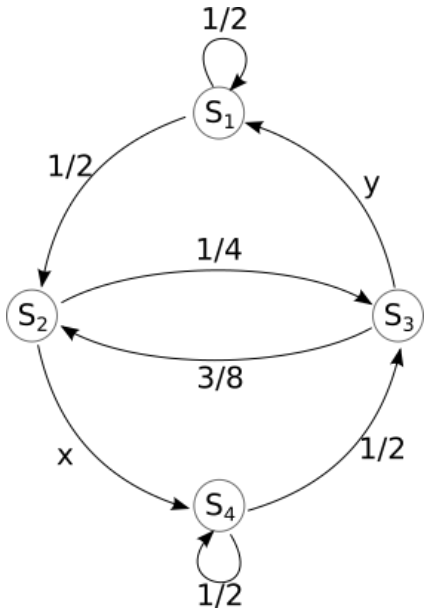

Figure 1: Graphical representation of the source

a. What are the values of x and y?
b. Write the transition matrix $[T]$;
c. Compute the entropy in state S_4;
d. Compute the global entropy of the source;
e. What are the memory order, m, and the number of messages of the source, n?
f. If the source is initially in state S_2, in what states and with what probabilities will the source be after 2 messages?