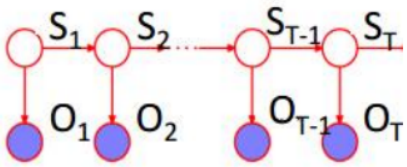
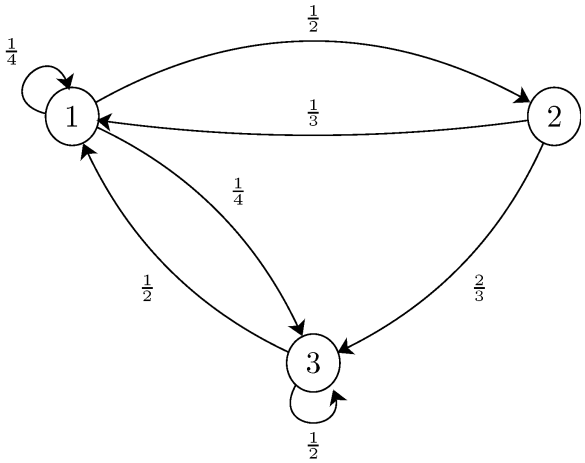
NLP Quiz 4, 30 min, 15 marks Name: Roll:

Q1)



Considering the above HMM model write the expression for $P(\{Ot\}_{t=1}T)$, where O_t are the observation and S_t are the states. Consider you have the following HMM parameters available $P(S_1)$, $P(S_t|S_{t-1})$, $P(O_t|S_t)$ [2 marks]

Q2) Answer the following based on state transition diagram below. [1+1+1+2]



1. Find $P(X_4=3|X_3=2)$
2. Find $P(X_3=1|X_2=1)$
3. If we know $P(X_0=1)=⅓$ find $P(X_0=1,X_1=2)$
4. If we know $P(X0=1)=⅓$ find $P(X0=1,X1=2,X2=3)$

Question 3)

A casino has two dice, one fair and another loaded (unfair).

Fair die P(1) = P(2) = P(3) = P(5) = P(6) = ⅙

Loaded die P(1) = P(2) = P(3) = P(5) = 1/10 P(6) = ½

Casino player switches back-&-forth between fair and loaded die once every 20 turns

Game:

1. You bet $1
2. You roll (always with a fair die)
3. Casino player rolls (maybe with fair die, maybe with loaded die)
4. Highest number wins $2

GIVEN: A sequence of rolls by the casino player : 6,2,6

1. How likely is this sequence, given our model of how the casino works? [3 marks]
2. What portion of the sequence was generated with the fair die, and what portion with the loaded die? [5 marks]