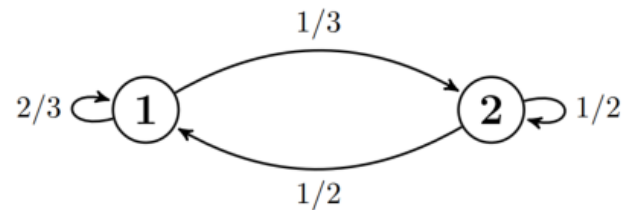# Assignment 5
Temporal Probability Model and Decision Tree

Note: please submit the solution in pdf format.

Question 1.

Consider a Markov chain for X specified by the following transition diagram. Please express all final answers as simplified fractions.

1.1. Given that $X_0 = 1$, find $P(X_1)$ and $P(X_2)$.

$P(X_1 = 1) =$ _____

$P(X_1 = 2) =$ _____

$P(X_2 = 1) =$ _____

$P(X_2 = 2) =$ _____

1.2. Find $P(X_\infty)$, the stationary distribution of our Markov Chain.

$P(X_\infty = 1) =$ _____

$P(X_\infty = 2) =$ _____

Question 2.

Given three attributes, A, B, C and one Boolean outcome Z as the class

A	B	C	Z
0	0	0	True
1	1	0	True
0	1	0	True
1	0	1	True
0	0	1	False
1	1	2	False
0	1	2	False
1	0	2	False

a) **WITHOUT** calculation, which attribute would information gain choose as the root of the tree? And why?

b) Draw the decision tree.
c) Classify the examples below as "True" or "False" using your decision tree.
   Note: if your decision tree is wrong, then your answers for (c) and (d) are **NOT** considered.
   - What class is [A=0, B=0, C=2]? (just answer "True" or "False")
   - What class is [A=1, B=1, C=1]? (just answer "True" or "False")