MATH50010 - Probability for Statistics
Unseen Problem 8

The transition matrix P of a Markov chain $\{X_n\}$ is:

$$
\mathbf{P} = \begin{pmatrix}
0 & 0 & 0 & 0 & 0 & 1/2 & 0 & 1/2 & 0 & 0 \\
0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\
0 & 0 & 1/2 & 0 & 1/4 & 0 & 1/4 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\
0 & 0 & 1/4 & 0 & 0 & 0 & 1/4 & 1/2 & 0 & 0 \\
1/2 & 0 & 0 & 0 & 0 & 0 & 0 & 1/2 & 0 & 0 \\
0 & 0 & 0 & 1/2 & 0 & 0 & 0 & 0 & 0 & 1/2 \\
1/2 & 0 & 0 & 0 & 0 & 1/2 & 0 & 0 & 0 & 0 \\
0 & 3/4 & 0 & 0 & 0 & 0 & 0 & 0 & 1/4 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0
\end{pmatrix}
$$

1. Derive the transition diagram from the transition matrix P.

2. Find the absorbing probabilities (i.e. the probability of entering a a class and never leaving) when we start at each of the recurrent states.

3. Find the stationary distributions of the chain.