# Homework Assignment 5 

Due Friday, April 22

1. Let

$$
P=\left[\begin{array}{ccc}
19 / 20 & 1 / 10 & 1 / 10  \tag{1}\\
1 / 20 & 0 & 0 \\
0 & 9 / 10 & 9 / 10
\end{array}\right]
$$

be the transition matrix of a Markov chain.
(a) Draw the transition diagram that corresponds to this transition matrix.
(b) Show that this Markov chain is regular.
(c) Find the long-term probability distribution for the state of the Markov chain.
2. Consider the following transition diagram:

(a) Find the transition matrix, and show that the Markov chain is regular.
(b) Find the long term probability distribution of the states $A, B$, and $C$.
3. We consider a modification of the "Coin and Die" game. The rules for Coin are the same:

- If the coin turns up heads, Coin wins.
- If the coin turns up tails, it is Die's turn.

The new rules for Die are:

- If the die turns up 1 or $\mathbf{2}$, Die wins.
- If the die turns up 3, Die rolls again.
- If the die turns up $\mathbf{4 , 5}$, or $\mathbf{6}$, it is Coin's turn.
(a) If Coin goes first, what is the probability that Coin wins, and what is the expected number of turns?
(b) If Die goes first, what is the probability that Coin wins, and what is the expected number of turns?

