7. You may use the program AbsorbingChain for this problem, but you should be able to do it using just the formula

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}^{-1} = \frac{1}{D}\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

where $D = ad - bc$.

(a) What is the expected number of tosses of a coin till two heads in a row occur?

(b) What is the expected number of tosses till the pattern HT occurs?

8. A coin is flipped repeatedly till either an HH or a TH occurs.

(a) What is the expected number of tails that come up?

(b) What is the expected number of times the coin is flipped?

(c) What is the probability that the last two outcomes are TH rather than HH?