ECE 6605
Information Theory

HW #3

1) Problem 2, Chapter 4 in C&T

2) For a 2 state stationary Markov chain with probability transition matrix:

$$P = \begin{matrix} p & 1-p \\ 1-p & p \end{matrix}$$

Prove:

a) the stationary distribution $\mu_1 = \mu_2 = 1/2$ for any value of p.
b) the entropy rate H(X) = H(p) where $H(p) = -p\log_2 p - (1-p)\log_2(1-p)$

3) For a 2 state stationary Markov chain with probability transition matrix:

$$P = \begin{matrix} 1/3 & 2/3 \\ 1/4 & 3/4 \end{matrix}$$

a) Find the stationary distribution μ_1 , μ_2
b) Find the entropy rate.

4. Consider a stationary 2-state Markov chain $\{X_i\}$ with probability transition matrix

$$P = \begin{matrix} p & 1-p \\ 1 & 0 \end{matrix}$$

a) Draw the state transition diagram and find the stationary distribution μ_1 , μ_2 .
b) Find the entropy rate.

5. Problem 1, Chapter 3. This is the proof of the Chebyshev inequality.