Communications Systems
Probability and Information Theory

1. Using Lagrange multipliers, find the probability distribution that maximizes the missing information (entropy) for an experiment with outcomes {0, 1, 2, … ,N-1}, and a mean value, μ .
   a) Write the function to be maximized, and the constraint equations. (There are two constraints.)
   b) Apply Lagrange's method to find the form of the probabilities.
   c) Do your best to apply the constraint equations for the general case. (The algebra gets a little deep, but see how far you can go.) Then let $N \to \infty$ and see if that case is easier.
   d) Apply the constraints for the case where $\mu = 1$ and $N = 5$. Octave/MATLAB could prove useful in this part.