Homework No. 2

1.   A memoryless, zero mean, unit variance Gaussian source is quantized using the
MMSE Gaussian quantizer characteristic in Table 4.3. Find the equivalent discrete
memoryless source and its entropy. Compare the performance of this quantizer to the rate
distortion bound.

2.   The following PARCOR coefficients are computed from a frame of speech data:
$p_1 = -0.9454$, $p_2 = 0.92386$, $p_3 = -0.56198$, $p_4 = -0.09454$, $p_5 = 0.20218$,

$p_6 = 0.53595$, $p_7 = -0.32922$, $p_8 = -0.05899$.
   (a) Do these coefficients represent a stable system?
   (b) What is the mean squared prediction error for this 8th order system?
   (c) Find the corresponding predictor coefficients for a 8th order predictor.
   (d) Use an impulse to excite the linear prediction model in (c) and synthesize the first
        60 samples. Assume zero initial conditions.
   (e) Repeat (d) but use the sequence in Table 6.5 as the excitation. Normalize as
        necessary.
   (f) Compare (d) and (e).