ESE 532 – Quiz # 7 Name _____

We are given a training sequence of samples of an audio signal:

$$\mathcal{X} = \{-10, -9, -8, -7, -5, -6, -2, +1, +2, +3, +4, +6, +8, +7, +9, +8\}.$$

1. **(4 pt)** Design a one-dimensional VQ of rate 1 bit/sample with initial codebook $\mathbf{y}_1 = -5, \mathbf{y}_2 = 5$. Use the squared-error distortion measure. What is the distortion of the final codebook?

2. **(4 pt)** Group the training sequence into blocks of two-dimensional vectors — each vector consists of two consecutive samples. Design a two-dimensional VQ of rate 1 bit/sample with initial codebook $\mathbf{y}_1 = (-9, -9), \mathbf{y}_2 = (-4, -4), \mathbf{y}_3 = (+4, +4), \mathbf{y}_4 = (+9, +9)$. Use the squared-error distortion measure. What is the distortion of the final codebook?

Do no more that three iterations of the LBG algorithm. [Hint: Do this graphically.]