

ECE3141 Sem 1, 2022 Lab 1 Report Feedback

1. Most students described midrise and midtread quantisers correctly with advantage and disadvantage. But some only talk about their superficial differences without thinking about how those differences actually affect their performance.
2. Overall, students are aware that quantisation noise equals the difference of quantised signal vector – original analogue signal vector and $10 \cdot \log_{10}(P_{\text{signal}}/P_{\text{noise}})$ was used. Some had to be reminded that Power is proportional to Voltage squared. Some used MATLAB 'snr' function which just needs the signal and noise voltage inputs without squaring them.
3. Most students understood why the gradient of the SNR vs m graph was about 6dB per bit.
4. Most understood the difference between non-integer multiple, integer multiple and large integer multiple of the sampling rate compared with the original sin signal frequency generated. Most looked at the noise histogram for specific m values. Some even compared noise histograms for multiple m values. They understood why non-uniform noise histograms cause some havoc in the SNR vs m graphs. Some struggled to make the connection, however. Most understood that these different sampling rates (at least integral vs non-integral multiples) do not make a difference with real world signals that are already random.
5. For speech vs music, most students experienced more noise in speech vs music for the same quantiser bits m. The differences could be explained by most students based on the differences in pdf of noise for each of the signals.
6. Good number of students attempted the optional section of question 7 (kudos!). A little confusion occurred over the quantization step range as to whether the steps shrink with the signal attenuation but it was clarified that the step sizes remain unchanged despite the signal attenuation. Most estimated the used quantized steps close to 160 and at least 140. Some estimates were a bit off.