Assignment 1 Report

Quantization

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1. Uniform Scalar Quantizer

- **First step was to shift the input signal by the offset using this equation:**
  shifted_val = in_val - (m * delta / 2)
- **Then we rounded it to the nearest level and clip the signal from 0 to L-1**

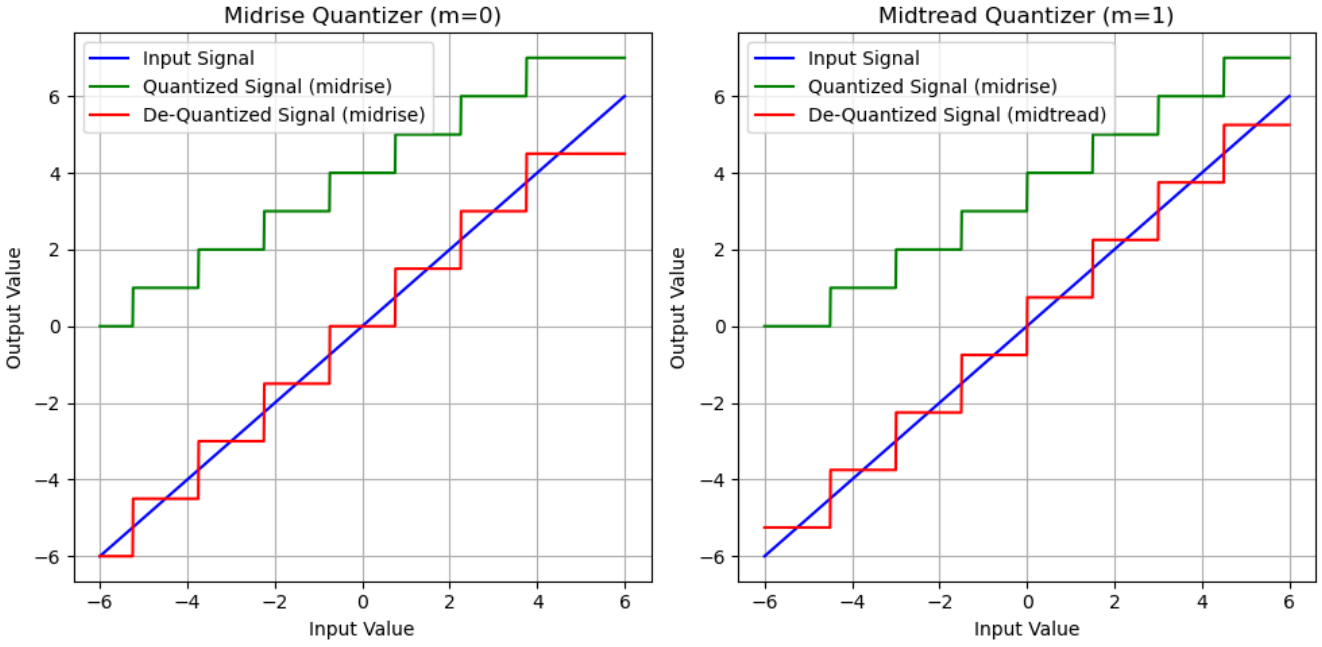
2. Uniform Scalar De-Quantizer

- **We reconstructed the signal according to this formula:**
  deq_val = (q_ind - L / 2 + m / 2) * delta

Quantizer and De-Quantizer are made using scalar division and independent of the bitrate

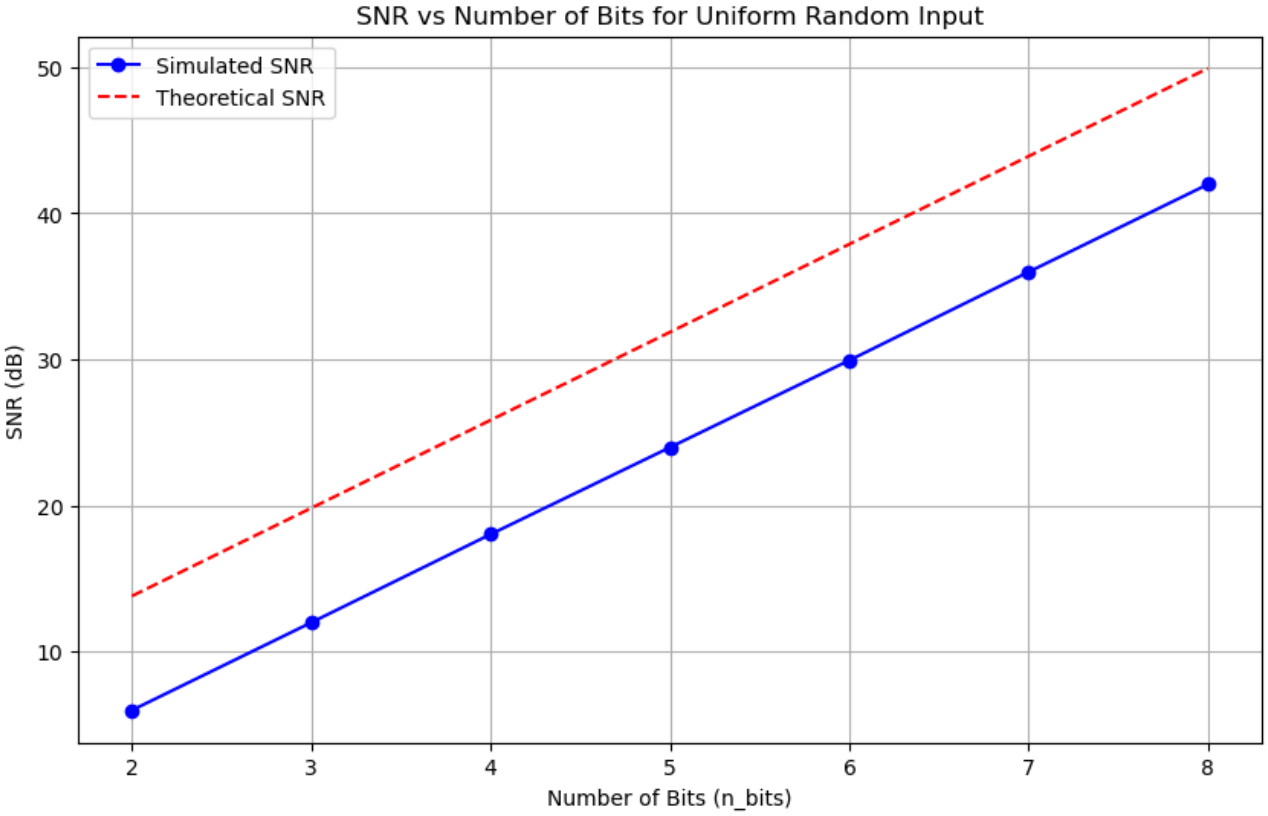
3. Testing on Deterministic Input

- **Tested Quantizer and De-Quantizer on a ramp signal and got the correct signals**



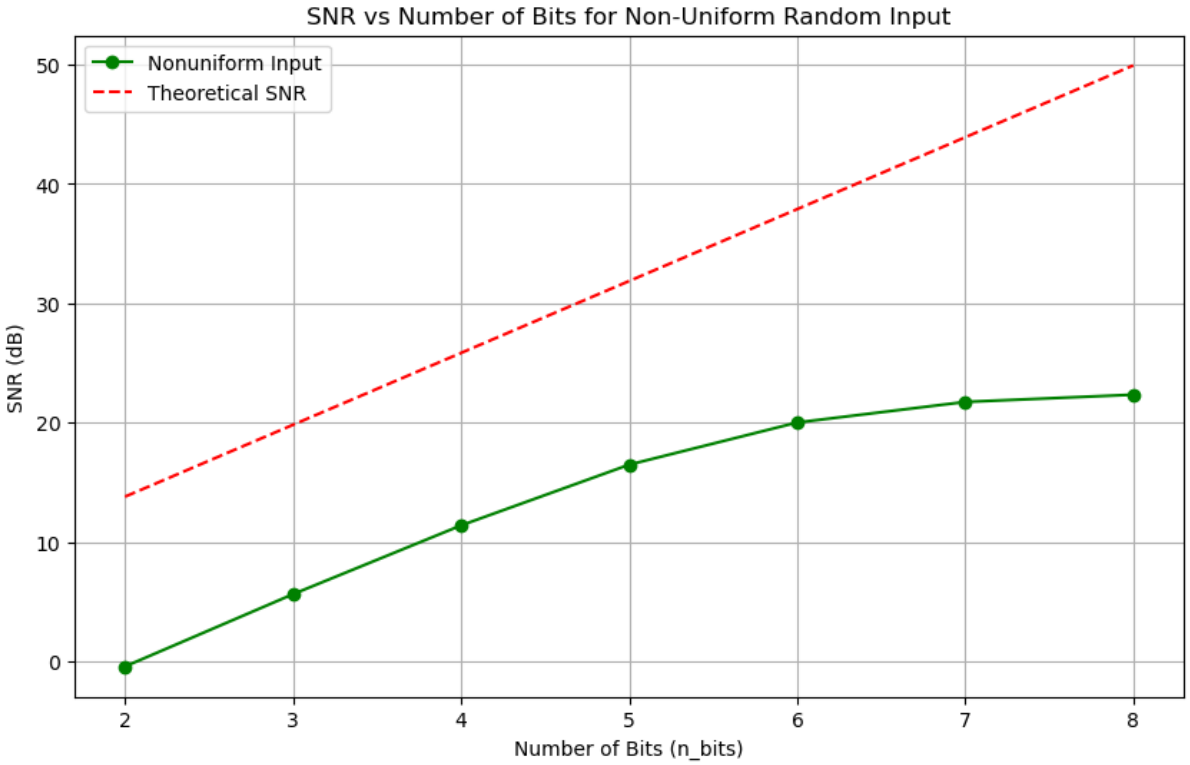
4. Testing on Uniform Random Input

- **Tested SNR results on a uniform random input signal and compared it to the theoretical values**



5. Testing on Non-Uniform Input

- **Tested SNR results on an exponentially distributed random input signal and compared it to the theoretical values**



6. μ\mu-Law Quantization

- **Implemented a non-uniform quantizer using a uniform quantizer by using (μ Law) with compressing the signal before quantization and expanding it after de-quantization**