[[1]](#footnote-1)

Speech Signal Processing Lab 10

郭锦岳，11510478

# Question 11.28

(a)

Code:

signal = audioread('s5.wav');

signal\_8 = fxquant(signal, 8, 'round', 'sat');

signal\_9 = fxquant(signal, 9, 'round', 'sat');

snr8 = snr(signal\_8, signal);

snr9 = snr(signal\_9, signal);

>>

snr8 = 37.8333

snr9 = 43.4176

snr9 – snr8 = 5.5843

The value roughly matches the expected amount 6 dB, as the bit number is increased by one.

(b)

To compute the values, I write a function called SNRplot, which plots two lines in a single run: the mu-law curve and the corresponding uniform curve.

Code:

function [ signal ] = SNRplot( signal, mu, bit)

%SNRPLOR plot a single line

% signal: input signal array

% mu: factor for mu-law

% bit: quantization bit number

% x-axis: 1/sigma, 13 samples

% y-axis: SNR, 13 samples

factor = 1\*2.^(0:-1:-12)';

signal = factor\*signal';

signal = signal';

SNR\_mu = zeros(1,13);

SNR\_uni = zeros(1,13);

standard = std(signal);

% mulaw and quantization

for i = 1:13

signal\_f = signal(:,i);

signal\_compress = mulaw(signal\_f, mu);

signal\_q = fxquant(signal\_compress, bit, 'round', 'sat');

signal\_expand = mulawinv(signal\_q, mu);

SNR\_mu(i) = snr(signal\_expand, signal\_f);

SNR\_uni(i) = snr(fxquant(signal\_f,bit,'round','sat'),signal\_f);

end

semilogx(1./standard, SNR\_mu);

semilogx(1./standard, SNR\_uni,'--');

grid;

Running:

clear;clc

mu = 500;

signal = audioread('s5.wav');

hold on;

for i = 10:-1:6

SNRplot(signal, mu, i);

end

hold off;

xlabel('1/sigmax');ylabel('SNR in dB');title(sprintf('mu=%d',mu));

legend('10bit','10bit','9bit','9bit','8bit','8bit','7bit','7bit','6bit','6bit');







1. [↑](#footnote-ref-1)