Solutions to PS #2 , Spring 2001
Signal Processing Using MATLAB, EECE-495
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```
% Function implementing uniform quantization of
% a floating point format discrete--time signal
% to B bits in round--off and saturation mode
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% DATE : 02/07/01
% USAGE:
% [x_q,alphab,SNR] = fxquant(x,B,opt);
% B : Bit resolution of quantizer
% opt : 1 --> round--off, 2--> saturation
% x_q : quantized output
% alphab : output alphabet
% SNR    : SNR of quantized signal
%************************************************
function  [x_q,alphab,SNR] = fxquant(x,B,opt);
%  Error control
if length(x) == 0
   error('Null input')
elseif any(x) == 0
   error('Zero Input')
elseif isnumeric(x) == 0
   error('Non-numeric input')
elseif all(isfinite(x)) == 0
   error('Nan/Inf elements in input')
elseif B <= 0
   error('Bit resolution has to be + ve')
elseif opt~=1 & opt~=2
   error('Invalid option entered')
end
arang = range(x)/2; delta = arang/2^B;
alphab = [-arang:delta:arang];
for i = 1:1:length(x)
    if opt == 1
       e = x(i)*ones(1,length(alphab)) - alphab;
    else
       e = ceil(x(i)/delta)*delta*ones(1,length(alphab)) - alphab;
    end
    [val,loc] = min(abs(e).^2);
    x_q(i) = alphab(loc);
end
SNR = 20*log10(std(x)/std(x - x_q));
return
```