
LAB 7 Resampling

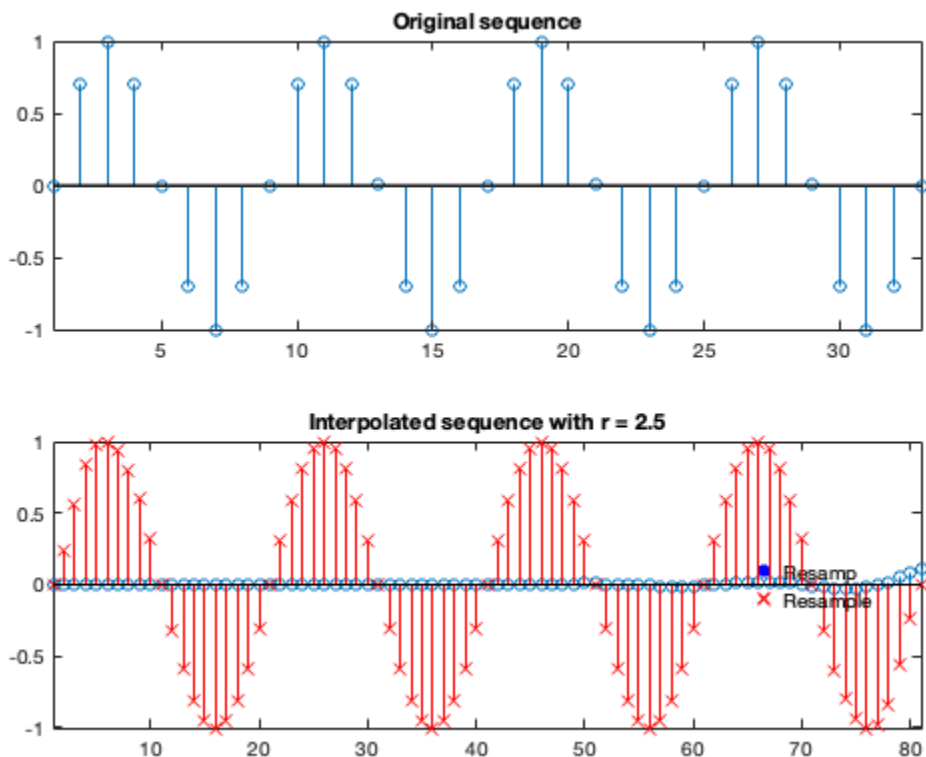
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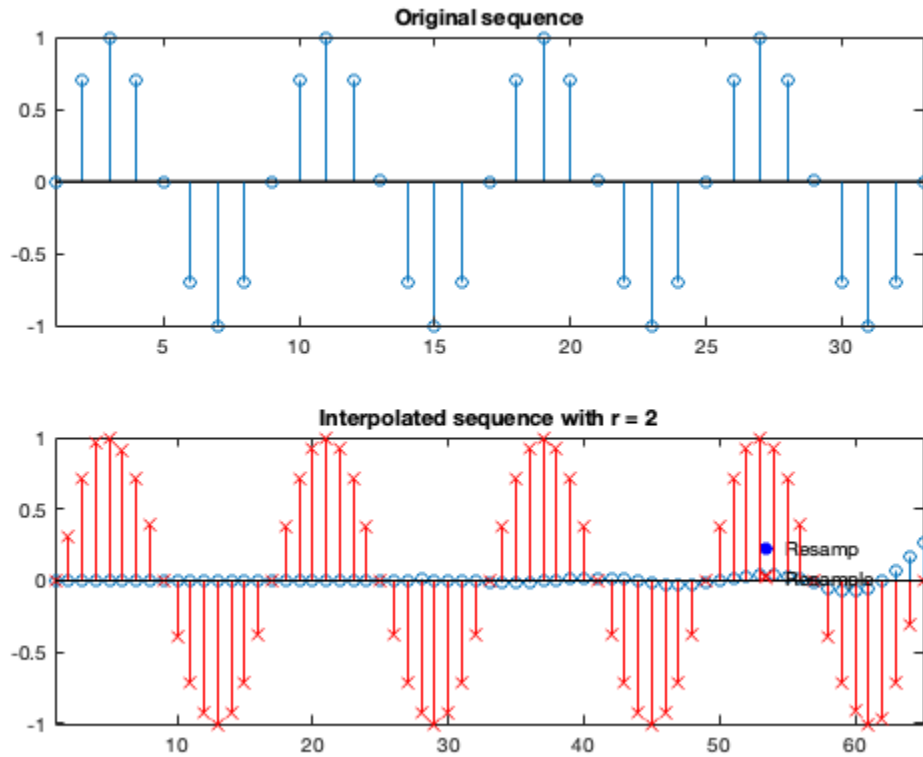
Testing resampling of a sin at $(5/2)$ fs

```
close all hidden
x = sin(2 * pi * (0:32) / 8);
test_resamp(x, 2.5);
```



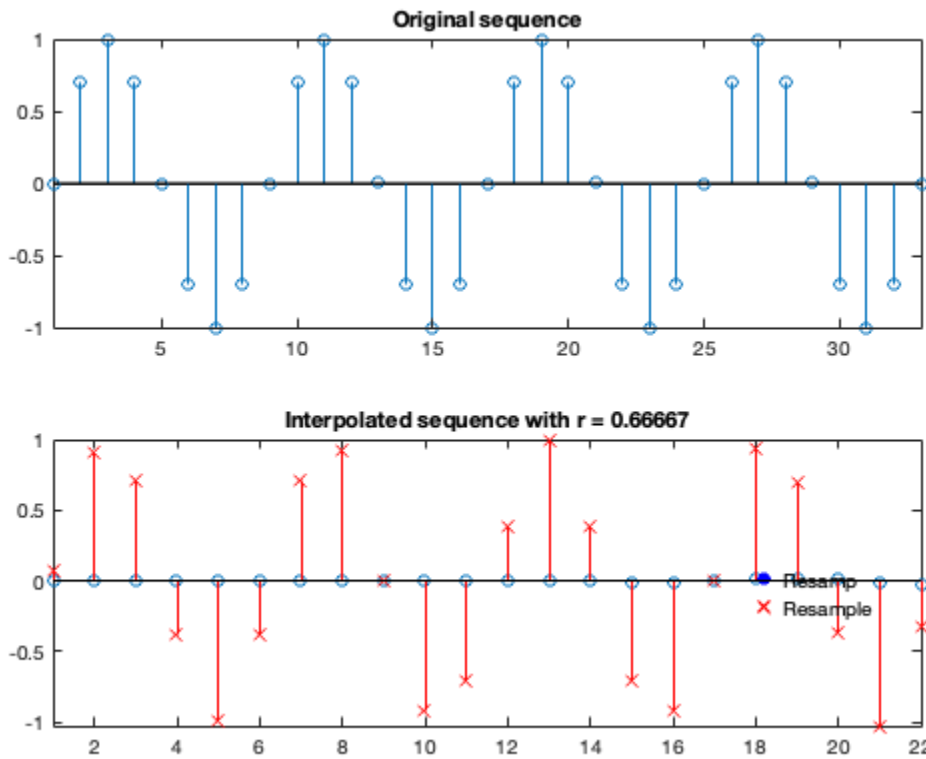
Testing resampling of a sin at $2f_s$

```
test_resamp(x, 2);
```



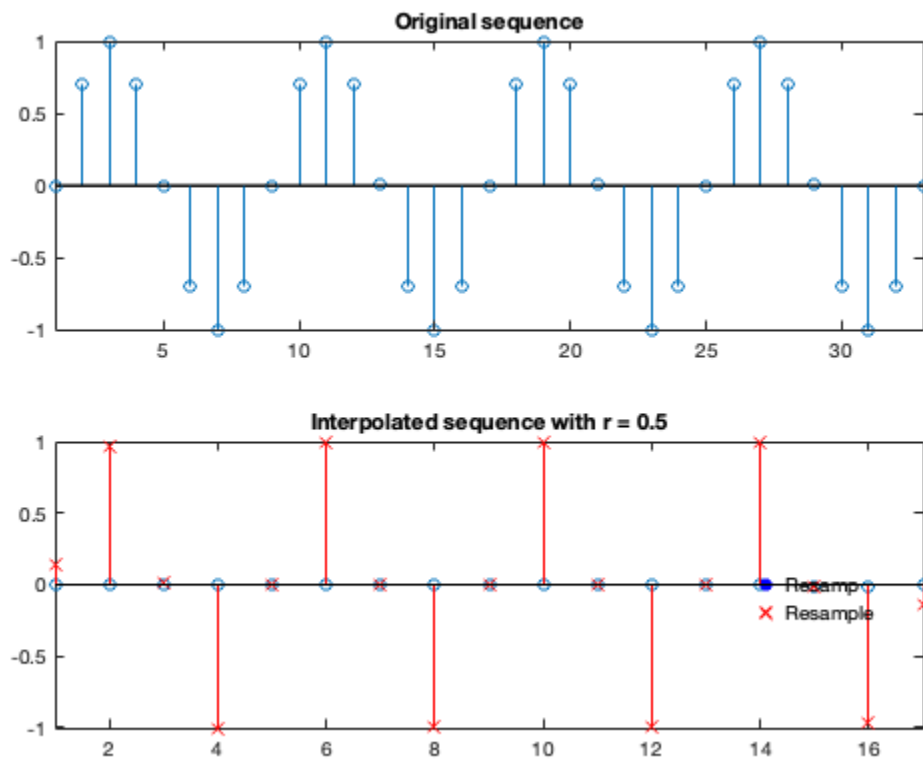
Testing resampling of a sin at $(2/3)f_s$

```
test_resamp(x, 0.666667);
```



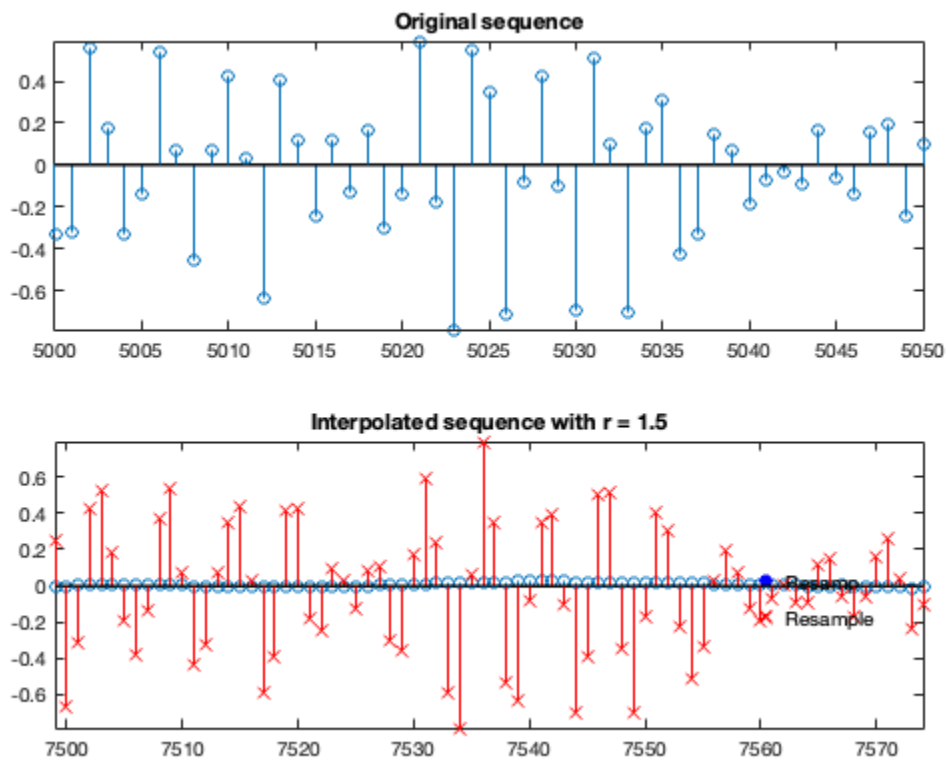
Testing resampling of a sin at $(1/2)fs$

```
test_resamp(x, 0.5);  
  
% Make sure that you have the file 'seashell.wav' in your directory  
fileName = 'seashell';  
if (version > 7)  
    [x, fs] = audioread([fileName '.wav']);  
else  
    [x, fs] = wavread(fileName); %#ok<DWVRD>  
end
```



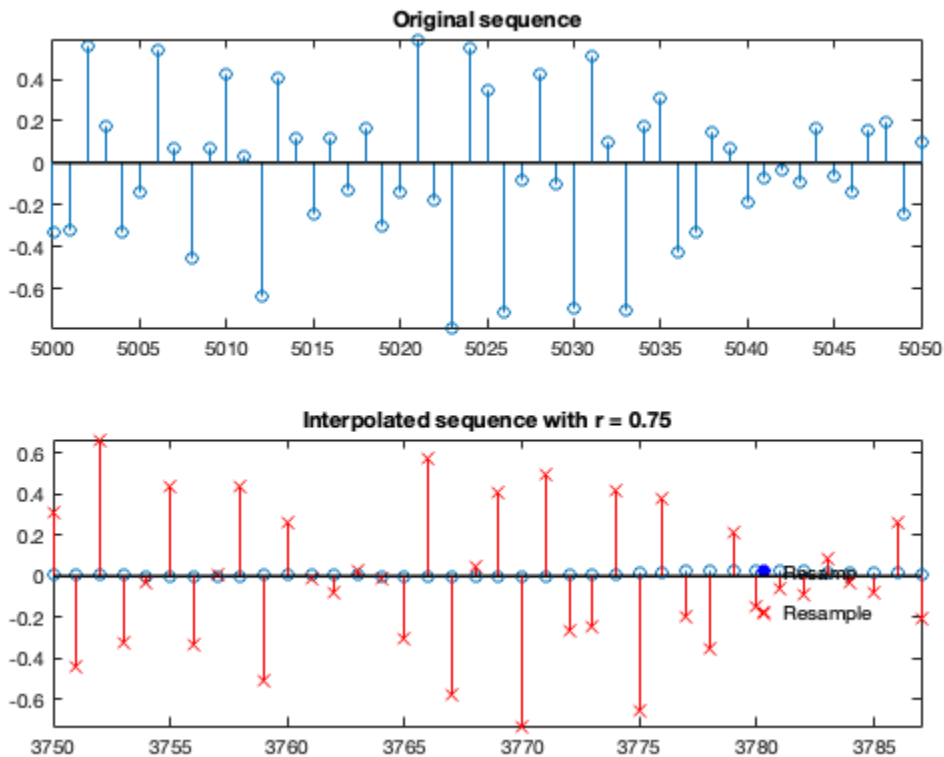
Testing resampling of 'seashell' at $(3/2)f_s$

```
test_resamp(x, 1.5, 5000, 5050);
```



Testing resampling of 'seashell' at $(3/4s)fs$

```
test_resamp(x, 0.75, 5000, 5050);
```



Print program

```
disp(' ')
disp('--- resamp.m -----')
type('resamp')

--- resamp.m -----

function y = resamp(x, r)
% RESAMP Resample an input sequence x by a factor of r
%         to produce an output sequence y by a combination
%         of upsampling and downsampling.
%         For example,
%         y=resamp(x,1.5);
%         will upsample x by 3 and downsample by 2.

[up_rate, down_rate] = rat(r); % Find rational approximation

y = zeros(1, length(x) * up_rate); % Pre-allocate output array
y(1:up_rate:end) = x; % Upsample by inserting zeros

% Design lowpass kaiser filter
wc = 1/max(up_rate, down_rate); % Set cutoff frequency
fn = wc/pi; % Normalized frequency
N = round(1+20/fn); % Filter length and order increases as fn decreases
```

```
h = fir1(N-1, wc/pi, kaiser(N, 5));  
  
y = filter(h, 1, y); % Filter the upsampled sequence  
y = y(1:down_rate:end); % Downsample
```

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