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22L-7638

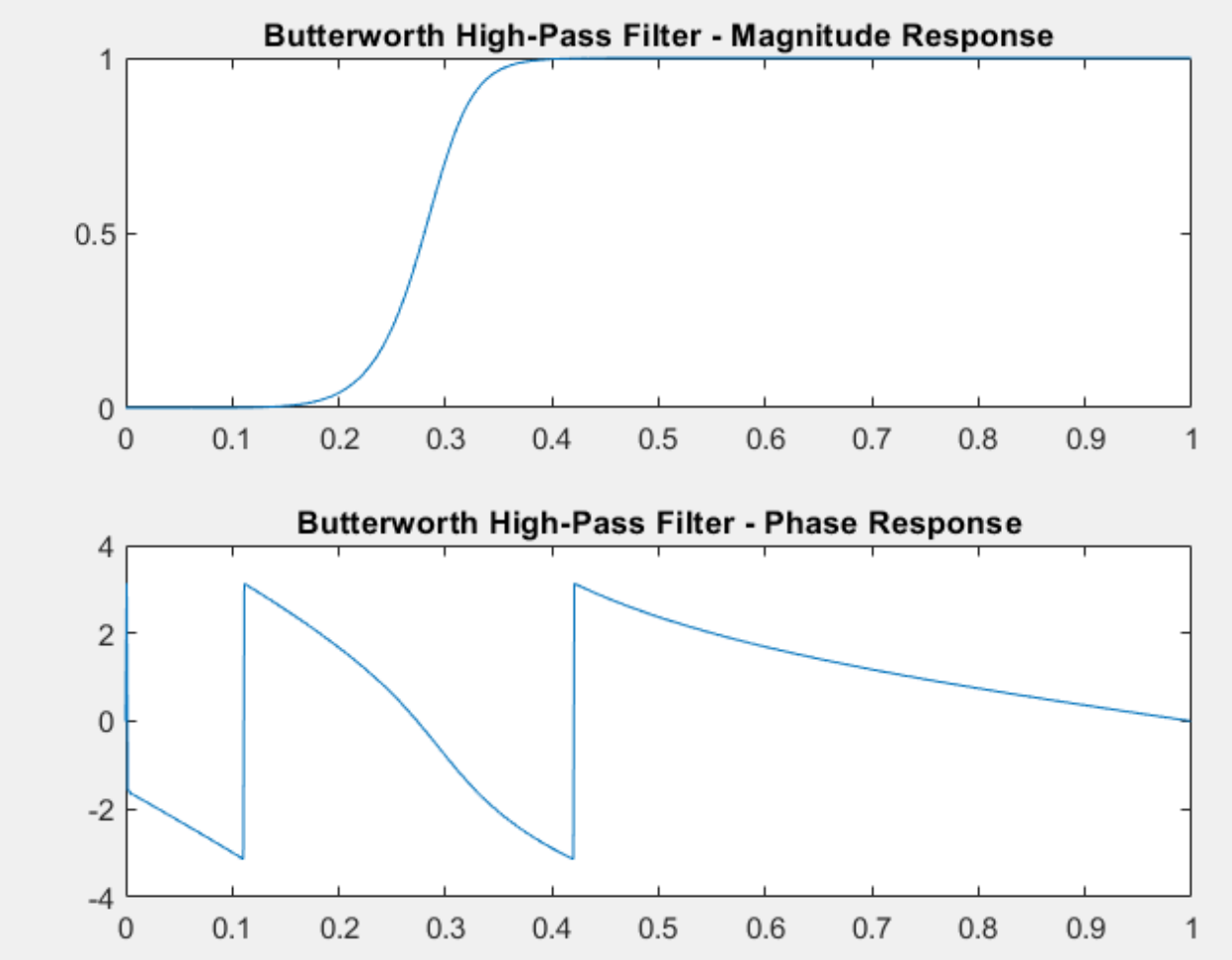
Question 1

A)

```
order = 7;
fc = 0.3;
[b_butter, a_butter] = butter(order, fc, 'high');
[H_butter, W] = freqz(b_butter, a_butter, 1024);

figure;
subplot(2,1,1);
plot(W/pi, abs(H_butter));
title('Butterworth High-Pass Filter - Magnitude Response');

subplot(2,1,2);
plot(W/pi, angle(H_butter));
title('Butterworth High-Pass Filter - Phase Response');
```

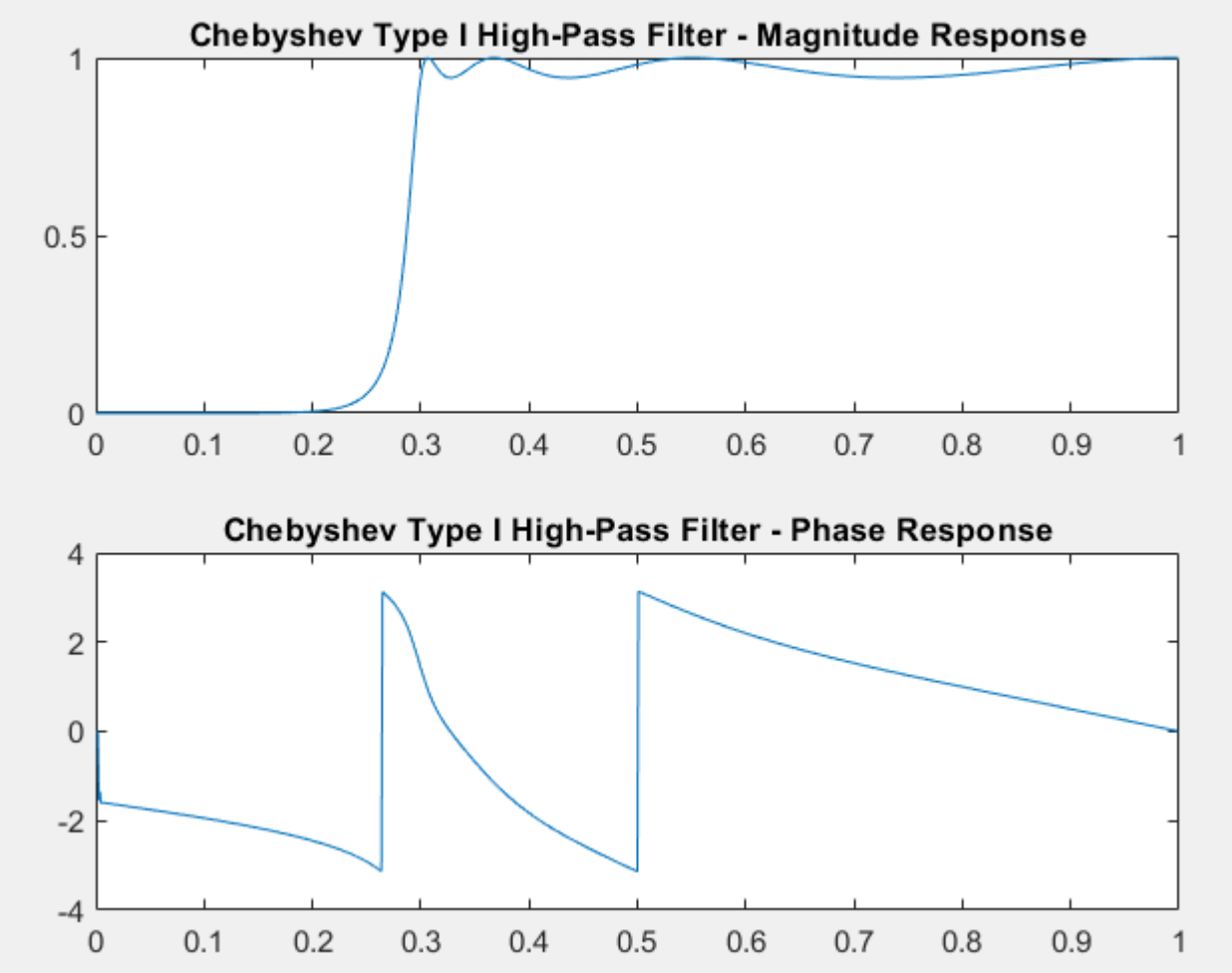


B)

```
R = 0.5;
[b_cheby, a_cheby] = cheby1(order, R, fc, 'high');
[H_cheby, W] = freqz(b_cheby, a_cheby, 1024);

figure;
subplot(2,1,1);
plot(W/pi, abs(H_cheby));
title('Chebyshev Type I High-Pass Filter - Magnitude Response');

subplot(2,1,2);
plot(W/pi, angle(H_cheby));
title('Chebyshev Type I High-Pass Filter - Phase Response');
```



Question 2

```
order = 7;
R = 0.5;
fc = 0.3;
Fs = 1000;
t = (0:999)./Fs;

input_signal = randn(1000,1);

[b_butter, a_butter] = butter(order, fc, 'high');
output_butter = filter(b_butter, a_butter, input_signal);

[b_cheby, a_cheby] = cheby1(order, R, fc, 'high');
output_cheby = filter(b_cheby, a_cheby, input_signal);

figure;
subplot(3,1,1);
plot(t, input_signal);
title('Input Signal');

subplot(3,1,2);
plot(t, output_butter);
title('Butterworth Filtered Signal');

subplot(3,1,3);
plot(t, output_cheby);
title('Chebyshev Filtered Signal');
```