

ECE 4213/5213

Homework 8

Fall 2023

Dr. Havlicek

Work the following Questions from Chapter 4 of the course laboratory manual.

For your report, use the file LABEX4.doc from the course web site.

Work these questions **only**:

1. Q4.1, do $M = 3$ and $M = 7$ only.
2. Q4.2.
3. Q4.3. To answer the question about which filter you would choose, use `residuez` to find the poles of the two transfer functions in (4.36) and (4.37) and remember that we normally want a filter that is both causal and BIBO stable.
4. Q4.4. This filter is a narrow bandstop filter, or “notch” filter. The stopband or “notch” is a narrow range of frequencies around 0.3π radians per sample, or 0.3 on the normalized frequency scale. You should see that the group delay is approximately constant in the passband (away from the notch).
5. Q4.5. In case you had some trouble with the question about which filter you would choose in Q4.3, it should be clear after you do this one (you will see that if you invert (4.37) to obtain a causal impulse response, it is definitely unstable).
6. Q4.6. This question is pretty straightforward. It will again reinforce the fact that for causal realizations, the filter in (4.36) is BIBO stable because the poles are inside the unit circle, whereas the one in (4.37) is unstable because the poles are outside the unit circle.
7. Q4.7.
8. Q4.10. Do $N = 13, 14, 19$, and 99 only.
9. Q4.11. Make sure to get the file `gain.m` from the handouts section of the course web site and put it in your working directory! It can be found under Handouts/Lab Manual/PROGRAMS/LABEX4.
10. Q4.13. As in Q4.11, you need the file `gain.m` from the course web site!
11. Q4.16. You need the file `gain.m` from the course web site!
12. Q4.19. The background material for this question is explained in R4.24-R4.25 on pages 59-60 of the course Laboratory Manual and in the Module 7 notes at pages 7.31-7.51.

Submit this assignment electronically on Canvas.

DUE: 11/21/2023, 11:59 PM