

Exercises Week 13

DSP

1. Which of the following filters has a linear-phase? Justify the answer.

a. $H(z) = 7 + 3z^{-1} + z^{-2} + 7z^{-3} + 3z^{-4} + z^{-5}$

b. $H(z) = \frac{1+2z^{-1}+z^{-2}}{1-2z^{-1}+z^{-2}}$

c. $H(z) = 1 + 2z^{-1} + z^{-2}$

d. $H(z) = 1 - 2z^{-1} + z^{-2}$

e. $H(z) = 1 - 2z^{-1} - 2z^{-2} + z^{-3}$

f. $H(z) = 1 + 2z^{-1} + 7z^{-2} - 2z^{-2} - z^{-3}$

g. $H(z) = 1 - z^{-1}$

h. $H(z) = 1 - z^{-2}$

2. Draw the implementation structure of one of the following filter in
Direct-Form I / Direct-Form II / Direct-Form I Transposed / Direct-Form II
Transposed

$$H(z) = \frac{7 - 3z^{-1} + z^{-2}}{1 + 0.5z^{-1} - 0.75z^{-2} + 0.4z^{-3}}$$