351 Discussion 4 Solutions

1.

=

2.

a)

Thus satisfies the positivity requirement

b)

Scaling Property is not satisfied

3.

a)

b)

c)

= 3 +5 + 1 = 9

= 3 +5 + 1

= 3 +5 + 1

d)

The inverse DFT will simply be x[n] = [3 5 1]

e)

f)

Since X[k] are the coordinates for the un-normalized basis in part a), our result makes sense from two viewpoints: DFT or change of basis.

4.

This is not a valid basis. At least three vectors are required (and they must be linearly independent)

5.

6. The three normalized basis vectors are:

7.

The weights for the sum of are simply the DFT of x

So we just need to calculate the DFT of [1 2 1 4]

fft(x) =

It can be verified that

x[n] =