Applied Algebra Worksheet for lecture 16

Comments, questions and feedback due before class on Monday, April 6 (before 7am).

Completed worksheets due on Thursday, April 9.

Consider the potential wavelet transformation given by the following steps:

Start by breaking up your signal into even and odd parts

$$[x_{\text{even}}, x_{\text{odd}}]$$

Then using $p[k] = -x[2k] + 2x[2k + 2]$ as a prediction for the value at $x[2k + 1]$, set the detail d to be

$$d[k] = x_{\text{odd}}[k] - p[k]$$

And let P be the linear transformation taking $[x_{\text{even}}, x_{\text{odd}}]$ to $[x_{\text{even}}, d]$.

Finally, define the trend to be $s[k] = x_{\text{even}}[k] + d[k] - 2d[k - 1]$.

Let U be the linear transformation taking $[x_{\text{even}}, d]$ to $[s, d]$.

Problems

1. Write a matrix in block form for the linear transformation P
2. Write a matrix in block form for the linear transformation U
3. Write a matrix in block form for the linear transformation T_a which takes the vector $[x_{\text{even}}, x_{\text{odd}}]$ to $[s, d]$

4. Give an explicit presentation for this matrix in the case $N = 4$