CS4850 HW11

- We approximate a function by a wavelet system by solving the system:

$$
\begin{pmatrix} 3 \\ 1 \\ 4 \\ 8 \\ 3 \\ 5 \\ 7 \\ 9 \end{pmatrix}
=
\begin{pmatrix}
1 & 1 & 1 & 0 & 1 & 0 & 0 & 0 \\
1 & 1 & 1 & 0 & -1 & 0 & 0 & 0 \\
1 & 1 & -1 & 0 & 0 & 1 & 0 & 0 \\
1 & 1 & -1 & 0 & 0 & -1 & 0 & 0 \\
1 & -1 & 0 & 1 & 0 & 0 & 1 & 0 \\
1 & -1 & 0 & 1 & 0 & 0 & -1 & 0 \\
1 & -1 & 0 & -1 & 0 & 0 & 0 & 1 \\
1 & -1 & 0 & -1 & 0 & 0 & 0 & -1
\end{pmatrix}
\begin{pmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \\ c_6 \\ c_7 \\ c_8 \end{pmatrix}
$$

How do you efficiently solve for the coefficients $c_1, c_2, ..., c_8$? If the matrix is $n \times n$, how long does your algorithm take? Explain how your algorithm works.

- Explain why a harmonic function with a given boundary condition is unique.