Math 464
Homework: Due on 4/30

1) Reconstruct $g \in V_3$ given these coefficients in its Haar wavelet decomposition:

$$a^2 = [1, 4, 5, -3], \qquad b^2 = [-3, -2, 1, -1].$$

The first entry in each list correponds to $k = 0$. Sketch g.

2) Reconstruct $h \in V_3$ given these coefficients in its Haar wavelet decomposition:

$$a^1 = [3, -2] \quad b^1 = [-2, -3] \quad b^2 = [-3, -3, -1, -1].$$

The first entry in each list correponds to $k = 0$. Sketch h.

3) Let $j \geq 0$ be an integer. Let $f \in V_j$ with coefficients in its Haar wavelet decomposition $a^j, a^{j-1}, \ldots, a^1, a^0$ and $b^{j-1}, b^{j-2}, \ldots, b^1, b^0$. Assume that f is supported in the interval $[0, 1)$.

(a) Find a matrix that will transform a^j into $\{b^{j-1}, b^{j-2}, \ldots, b^0, a^0\}$.

(b) Find a matrix that will transform $\{b^{j-1}, b^{j-2}, \ldots, b^0, a^0\}$ into a^j.

(c) Verify that the matrices found in part a. and b. are inverse of each other.