

Quiz # 9

Please, type or write legibly, scan, save file as LASTNAME_FIRSTNAME.Q9.pdf and email to dlabate@math.uh.edu or dlabate@uh.edu. Must email to me no later than 11:30AM on 4/27.

Consider the following function defined in the interval $[0, 1]$:

$$f(x) = \begin{cases} -1 & \text{if } 0 \leq x < 1/4 \\ 2 & \text{if } 1/4 \leq x < 1/2 \\ 4 & \text{if } 1/2 \leq x < 3/4 \\ 1 & \text{if } 3/4 \leq x < 1 \end{cases}$$

(1) Find the Haar wavelet decomposition of f . That is, (1a) express f in terms of the basis for V_2 and then (1b) decompose f into its component parts for W_1, W_0, V_0 .

Recall that V_j and W_j are the spaces generated by $\phi(2^j x - k)$ and $\psi(2^j x - k)$, $j \geq 0$, respectively, where ϕ is the Haar scaling function and ψ is the Haar wavelet.

(2) Sketch each of the components of the Haar wavelet decomposition.