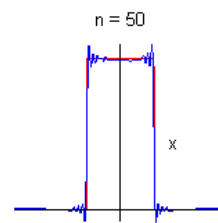
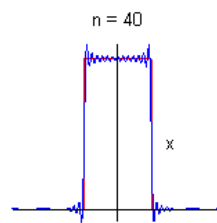
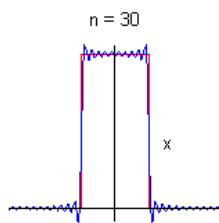
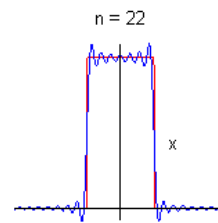
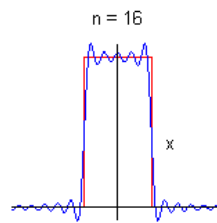
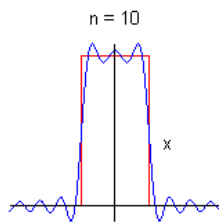
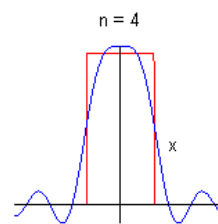
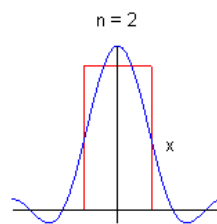
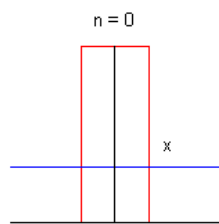
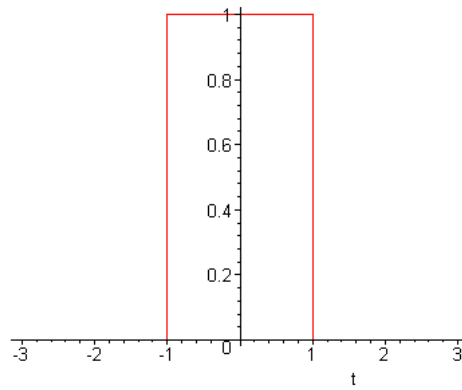
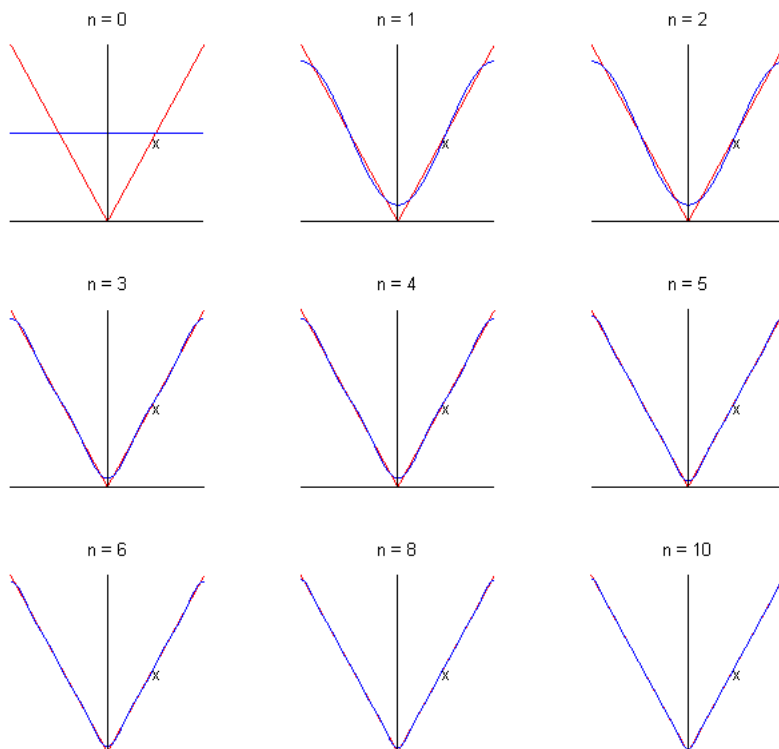
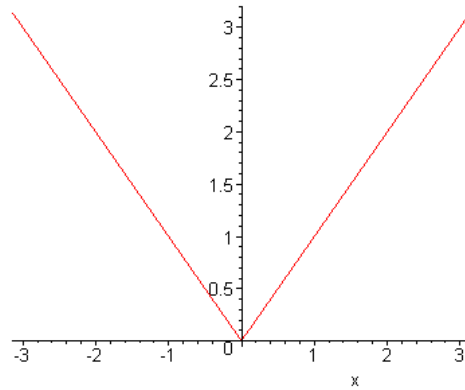


# Fourier Series Approximation for the Function

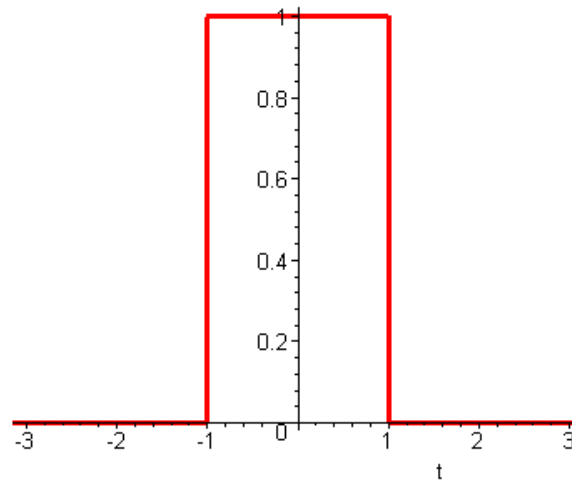
$$f(x) = \begin{cases} 1, & -1 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$



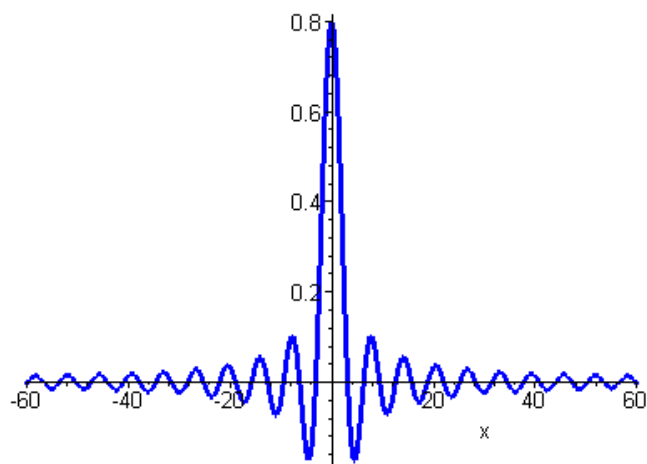
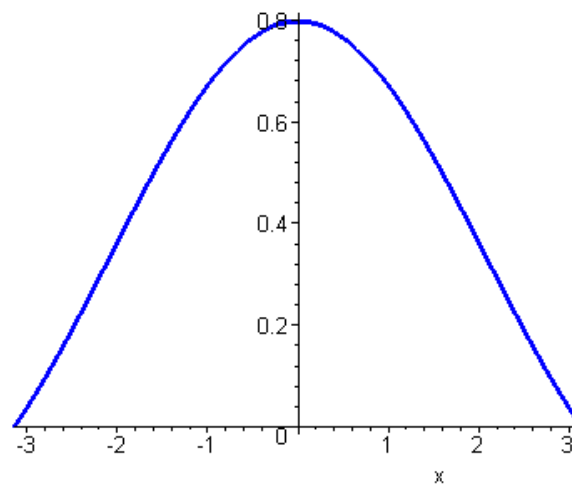
# Fourier Series Approximation for the Function $f(x)=|x|$



Fourier Transform of the Function  $f(t) = \begin{cases} 1, & -1 \leq t \leq 1 \\ 0, & \text{otherwise} \end{cases}$

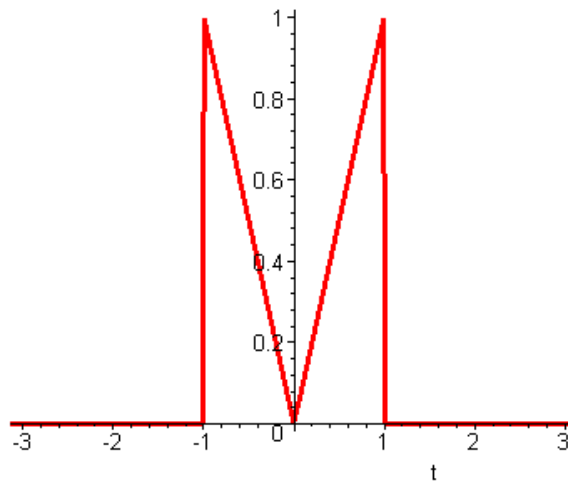


$$\tilde{f}(x) = \frac{\sqrt{2} \sin(x)}{\sqrt{\pi x}}$$

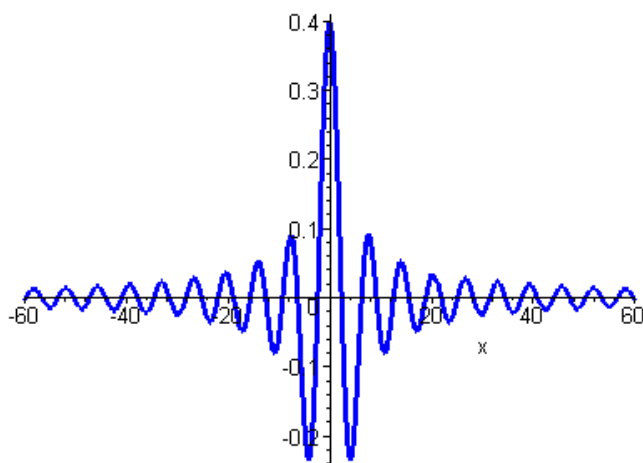
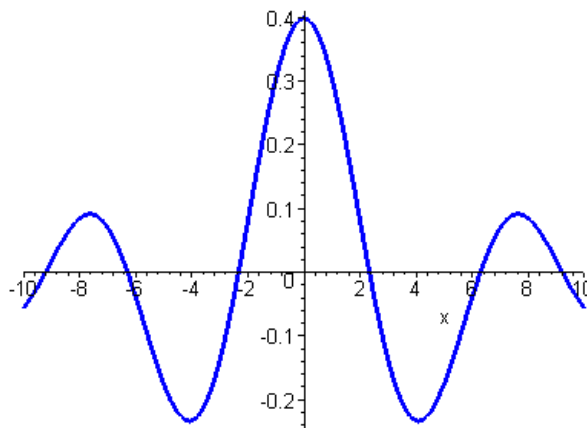


## Fourier Transform of the Function

$$f(t) = \begin{cases} |t|, & -1 \leq t \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

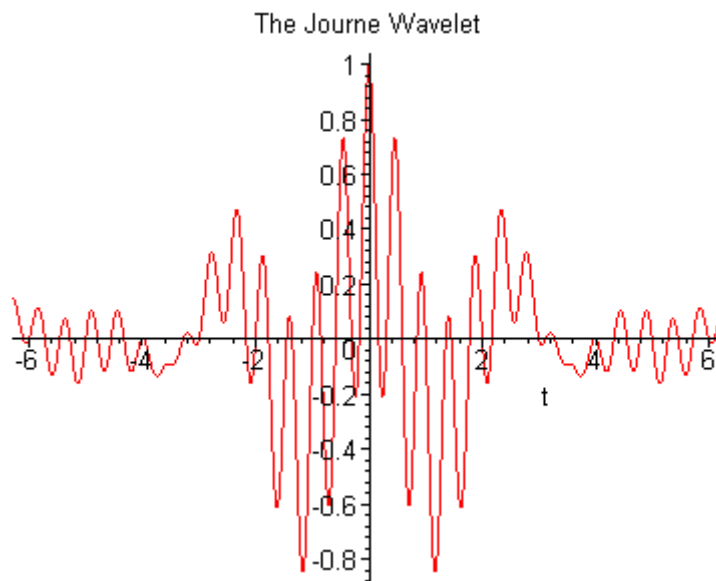
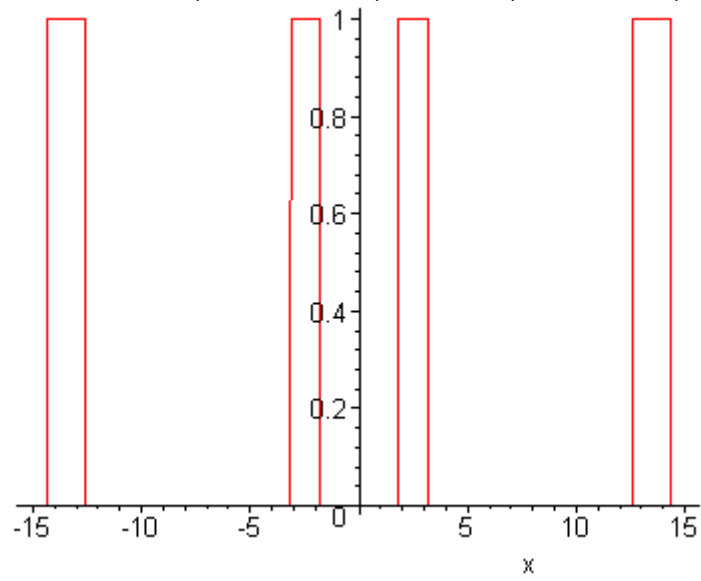


$$\tilde{f}(x) = \frac{\sqrt{2}(\cos(x) + x \sin(x) - 1)}{\sqrt{\pi} x^2}$$



## The Journe Wavelet Set

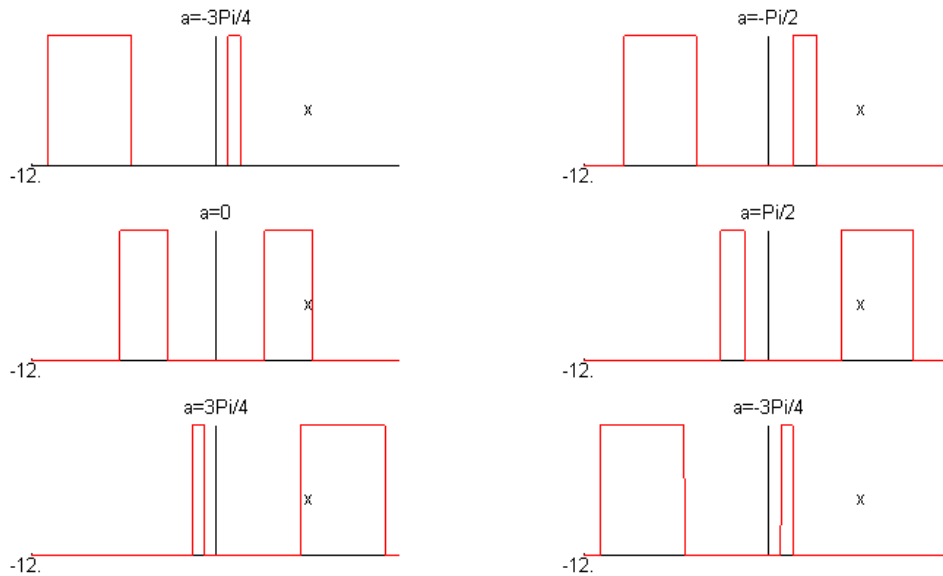
$$\left[ \frac{-32\pi}{7}, -4\pi \right) \cup \left[ -\pi, -\frac{4\pi}{7} \right) \cup \left[ \frac{4\pi}{7}, \pi \right) \cup \left[ 4\pi, \frac{32\pi}{7} \right)$$



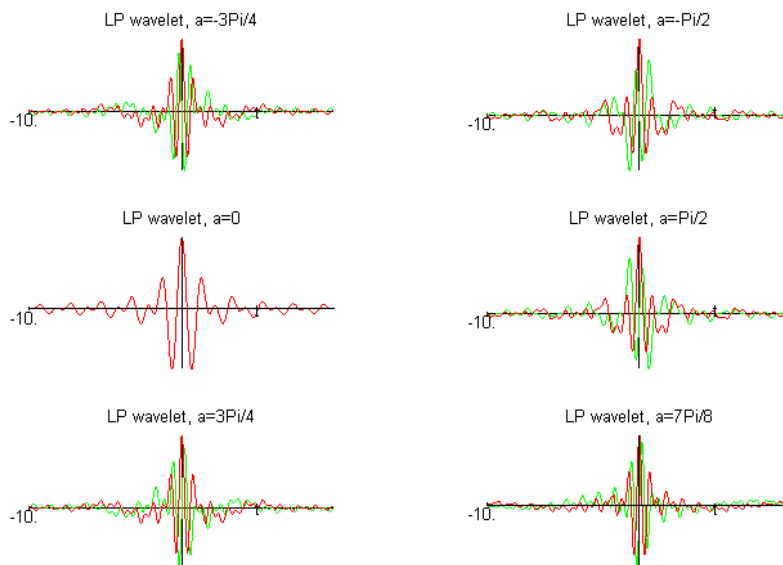
# The Littlewood-Paley Wavelet Set

$$[-2\pi + 2\alpha, -\pi + \alpha) \cup [\pi + \alpha, 2\pi + 2\alpha) \quad (-\pi < \alpha < \pi)$$

$$\alpha = \left\{ -\frac{3\pi}{4}, -\frac{\pi}{2}, 0, \frac{\pi}{2}, \frac{3\pi}{4}, \frac{7\pi}{8} \right\}$$



## The Real and Imaginary Littlewood-Paley Wavelets

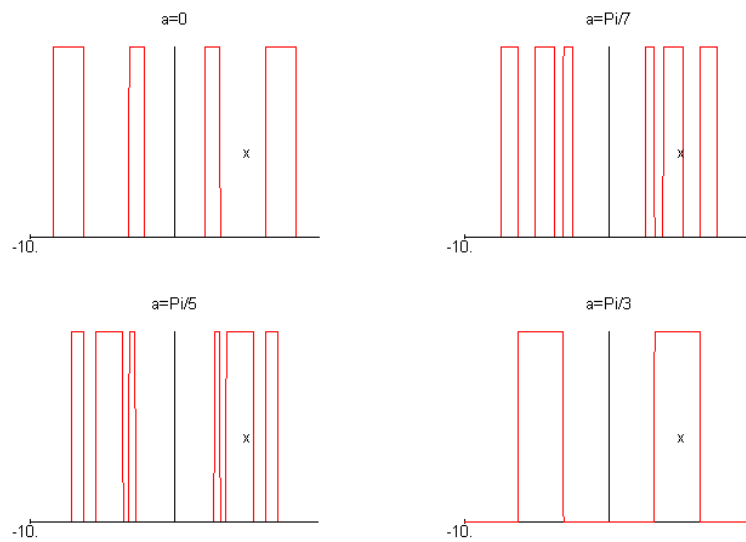


## Symmetric Wavelet Set

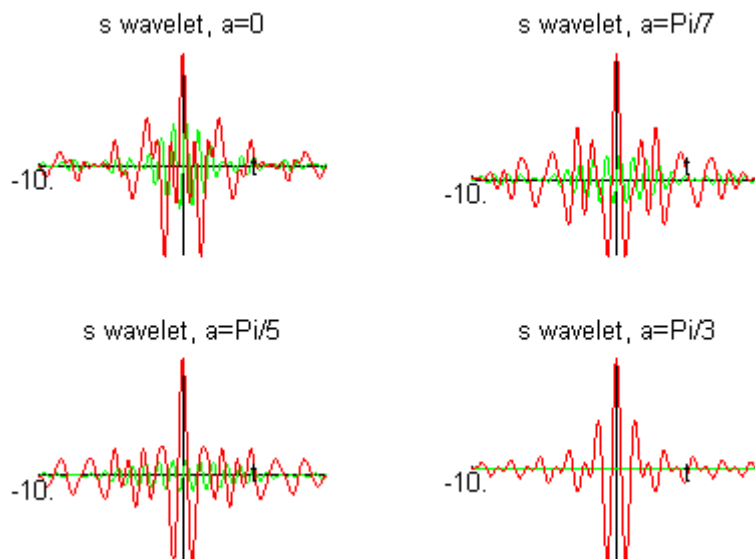
$$\left[ \frac{-8\pi}{3} + 2\alpha, -2\pi \right) \cup \left[ \frac{-4\pi}{3} - 2\alpha, \frac{-4\pi}{3} + \alpha \right) \cup \left[ -\pi, \frac{-2\pi}{3} - \alpha \right) \cup \left[ \frac{-2\pi}{3} + \alpha, \pi \right) \cup \left[ \frac{4\pi}{3} - \alpha, \frac{4\pi}{3} + 2\alpha \right) \cup \left[ 2\pi, \frac{8\pi}{3} - 2\alpha \right)$$

$$(0 < \alpha < \frac{\pi}{3})$$

$$\alpha = \left\{ 0, \frac{\pi}{7}, \frac{\pi}{5}, \frac{\pi}{3} \right\}$$



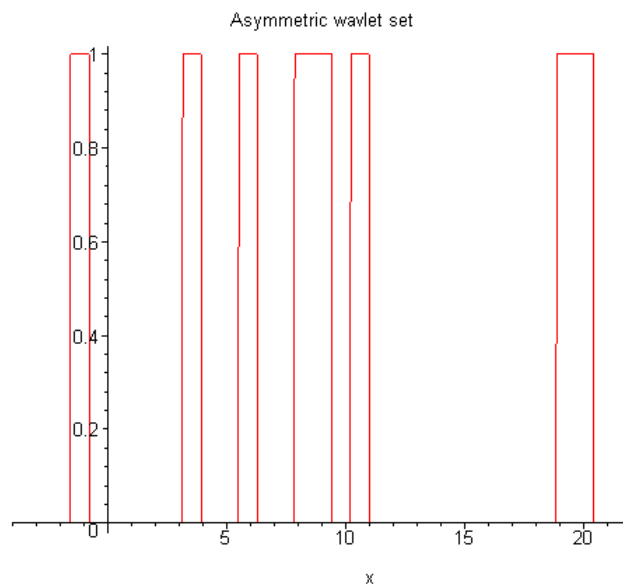
## The Real and Imaginary Symmetric Wavelets



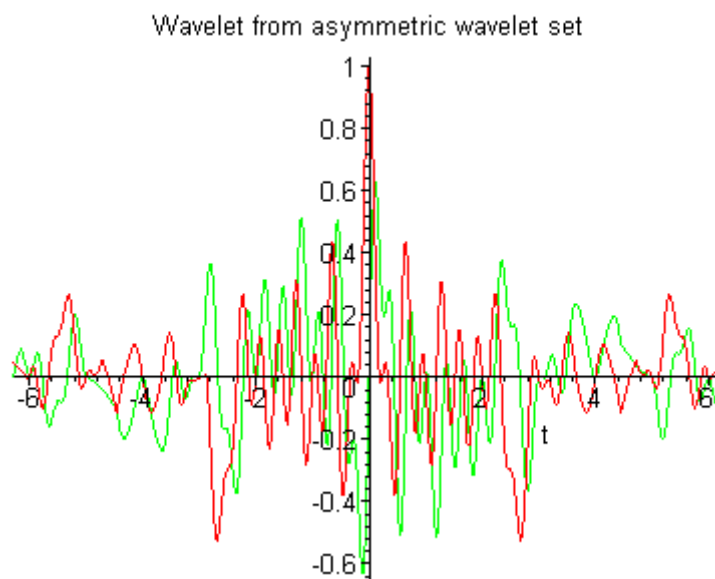
## Anti-symmetric Wavelet Set

$$\left[-\frac{\pi}{2}, -\frac{\pi}{4}\right) \cup \left[\pi, \frac{5\pi}{4}\right) \cup \left[\frac{7\pi}{4}, 2\pi\right) \cup \left[\frac{5\pi}{2}, 3\pi\right) \cup \left[\frac{13\pi}{4}, \frac{17\pi}{2}\right) \cup \left[6\pi, \frac{13\pi}{2}\right)$$

union of 1 negative intervals and 5 positive intervals



The **Real** and **Imaginary** Anti-symmetric Wavelet

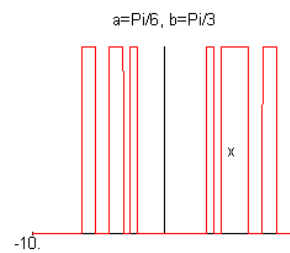
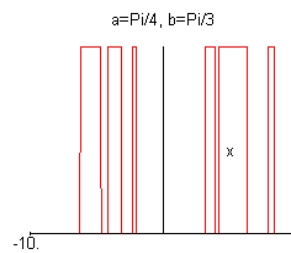
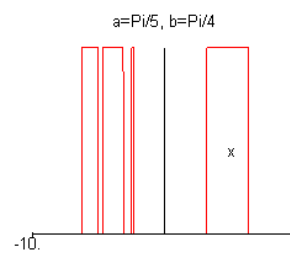
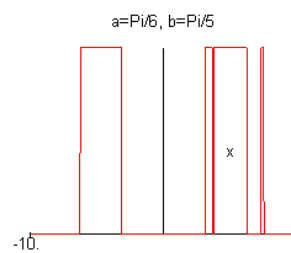


## Two Parameter Wavelet Set

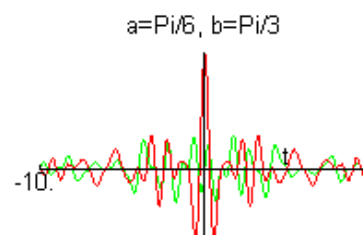
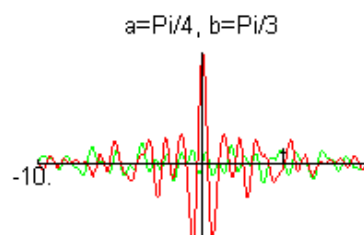
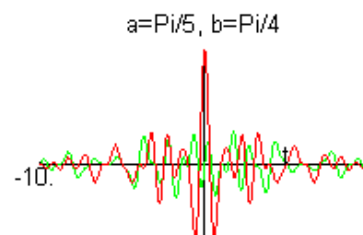
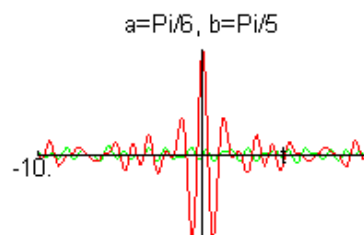
$$[-2\pi, -2\pi + 2\alpha) \cup [-2\pi + 2\beta, -\pi) \cup [-\pi + \alpha, -\pi + \beta) \cup [\pi, \pi + \alpha) \cup [\alpha + \beta, 2\pi) \cup [2\pi + 2\alpha, 2\pi + 2\beta)$$

$$(0 < \alpha < \beta < \frac{\pi}{2})$$

$$(\alpha, \beta) = \left\{ \left( \frac{\pi}{6}, \frac{\pi}{5} \right), \left( \frac{\pi}{5}, \frac{\pi}{4} \right), \left( \frac{\pi}{4}, \frac{\pi}{3} \right), \left( \frac{\pi}{6}, \frac{\pi}{3} \right) \right\}$$



## The Real and Imaginary Two Parameter Wavelets

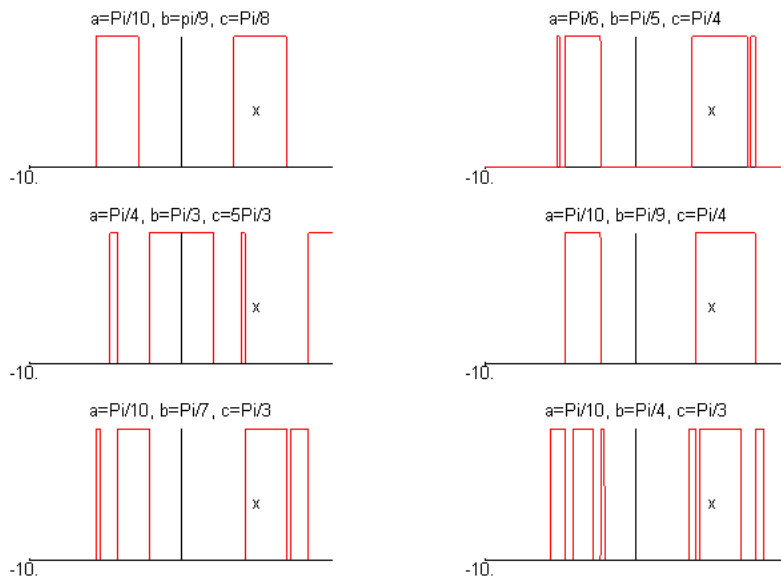


## Three Parameter Wavelet Set

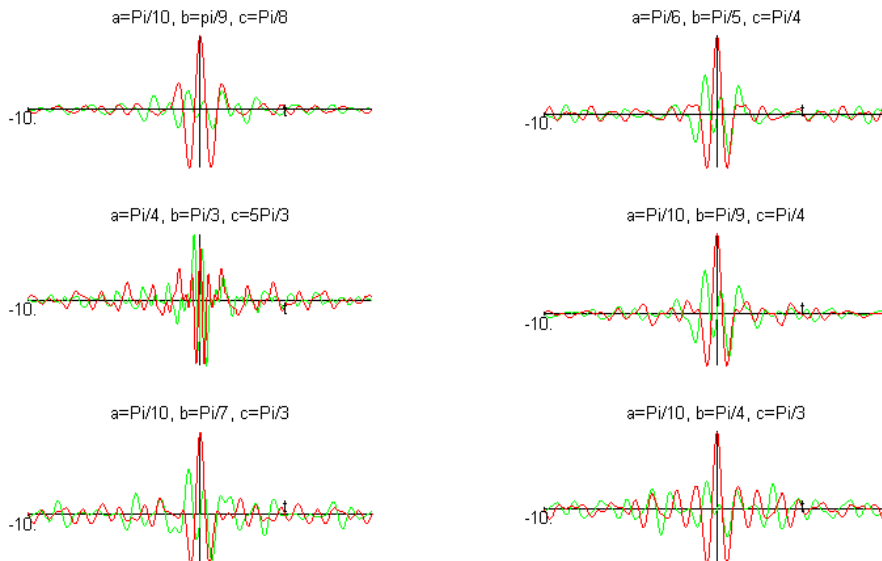
$$[-2\pi+2\alpha, -2\pi+2\beta) \cup [-2\pi+2\gamma, -\pi+\alpha) \cup [-\pi+\beta, -\pi+\gamma) \cup [\pi+\alpha, \pi+\beta) \cup [\pi+\gamma, 2\pi+2\alpha) \cup [2\pi+2\beta, 2\pi+2\gamma)$$

$$(0 < \alpha < \beta < \gamma < \frac{\pi}{2})$$

$$(\alpha, \beta, \gamma) = \left\{ \left( \frac{\pi}{10}, \frac{\pi}{9}, \frac{\pi}{8} \right), \left( \frac{\pi}{6}, \frac{\pi}{5}, \frac{\pi}{4} \right), \left( \frac{\pi}{4}, \frac{\pi}{3}, \frac{5\pi}{3} \right), \left( \frac{\pi}{10}, \frac{\pi}{9}, \frac{\pi}{4} \right), \left( \frac{\pi}{10}, \frac{\pi}{7}, \frac{\pi}{3} \right), \left( \frac{\pi}{10}, \frac{\pi}{4}, \frac{\pi}{3} \right) \right\}$$



## The **Real** and **Imaginary** Three Parameter Wavelets



## Four Parameter Wavelet Set

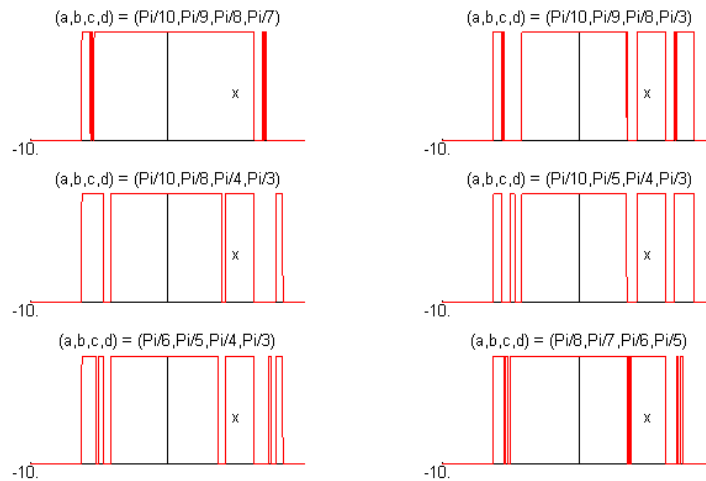
$$[-2\pi, -2\pi + 2\alpha) \cup [-2\pi + 2\beta, -2\pi + 2\gamma) \cup [-2\pi + 2\delta, -\pi) \cup [-\pi + \alpha, -\pi + \beta) \cup [-\pi + \gamma, -\pi + \delta)$$

$$\cup [\pi, \pi + \alpha) \cup [\pi + \beta, \pi + \gamma) \cup [\pi + \delta, 2\pi) \cup [2\pi + 2\alpha, 2\pi + 2\beta) \cup [2\pi + 2\gamma, 2\pi + 2\delta)$$

$$(0 < \alpha < \beta < \gamma < \delta < \frac{\pi}{2})$$

$$(\alpha, \beta, \gamma, \delta) =$$

$$\left\{ \left( \frac{\pi}{10}, \frac{\pi}{9}, \frac{\pi}{8}, \frac{\pi}{7} \right), \left( \frac{\pi}{10}, \frac{\pi}{9}, \frac{\pi}{8}, \frac{\pi}{3} \right), \left( \frac{\pi}{10}, \frac{\pi}{8}, \frac{\pi}{4}, \frac{\pi}{3} \right), \left( \frac{\pi}{10}, \frac{\pi}{5}, \frac{\pi}{4}, \frac{\pi}{3} \right), \left( \frac{\pi}{6}, \frac{\pi}{5}, \frac{\pi}{4}, \frac{\pi}{3} \right), \left( \frac{\pi}{8}, \frac{\pi}{7}, \frac{\pi}{6}, \frac{\pi}{5} \right) \right\}$$



## The **Real** and **Imaginary** Four Parameter Wavelets

