Plot Problem Number 4

This time we want to plot how well the Fourier Integral approximates the original function by truncating the infinite integral. The original function

$$f(x) = \begin{cases} \frac{\pi}{2} & |x| < 1 \\ 0 & \text{otherwise} \end{cases}$$

has the Fourier Integral representation given by

$$f(x) = \int_0^\infty \frac{\sin w}{w} \cos wx \, dw$$

and Fourier Integral approximations given by

$$f(x) = \int_0^N \frac{\sin w}{w} \cos wx \, dw$$

Plot on the same graph, for $-3 \leq x \leq 3$, the functions f and Fourier Integral approximations for $N = \pi, 2\pi, 4\pi$ and 10π.

The graph below was done for $f(x) = \pi x/2$ for $-1 \leq x \leq 1$ using the scilab file fi2.in. This scilab commands file is on line in our scilab directory.