

Hjälpmedel: Kurslitteratur, anteckningar och valfri räknare.

Telefon:

1. Determine the 2π -periodic function g in the equation $|\sin x| = g(x) \sin x$, and calculate $D^2 f$ for $f(x) = |\sin x|$. (6 p)
2. Consider sampling at the integers. Determine an alias of the function $\sin 4711x$ with frequency in the passband $(-1/2, 1/2)$, given that $0 < 1500\pi - 4711 < 1/2$. (6 p)
3. Show that the Fourier transform of the function of two variables $f(x) = \pi^{1/2}(x_1 + x_2) \exp(-\pi|x|^2)$ is the same function multiplied by some number, and determine that number. (6 p)
4. Let φ be a scaling function in some MRA which vanishes outside $(0, L)$, and this interval cannot be taken smaller. Show that the corresponding low-pass filter has length $L + 1$. (7 p)