01325 Mathematics 4, Spring 2013

Week no. 11

Theory: Wednesday April 24 the lectures cover pages 164–170 (wavelets)

Exercises for Wednesday April 24: 8.2, 8.6, 8.7 (i)-(vii), 8.11

Hints to Exercise 8.2: We know from Exercise 7.1 that $\widehat{\phi}(\gamma) = e^{-\pi i\gamma}\,\frac{\sin(\pi\gamma)}{\pi\gamma}$. Using this, you can calculate $\widehat{\phi}(2\gamma)$ and "pull out" the terms corresponding to $\widehat{\phi}(\gamma)$." What is left, corresponds to the function $H_0(\gamma)$. If you instead work with the expression $\widehat{\phi}(\gamma) = \frac{1-e^{-2\pi i\gamma}}{2\pi i\gamma}$, you can follow the same procedure, using that

$$1 - e^{-4\pi i\gamma} = (1 - e^{-2\pi i\gamma})(1 + e^{-2\pi i\gamma}).$$

Write now the function H_0 as a trigonometric polynomial, and use Theorem 8.2.7 to find the function H_1, also on the form of a trigonometric polynomial. Looking at the coefficients in this polynomial immediately yields the wavelet ψ via Proposition 8.2.8.

Homework 11, to be turned in no later than Wednesday May 8: 6.12 (i) (remember to check that the integral in the inner product is well defined), **8.4** (show that the coefficients in the series only are nonzero for finitely many values of k), **7.13** (put $g := D_\alpha f$ and apply Theorem 7.4.5 on the function g)

Regards,
Ole