MA677
MWF 9-9:50pm
CB 343
Fall 2011

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Exercises and amusements

1. Let P_S be the projection onto a closed subspace of a Hilbert space S as defined after Proposition 4.2. Show that $P_S(\alpha f) = \alpha P_S(f)$ for α a scalar and $f \in \mathcal{H}$.

Problems to be handed in

Due 23 September 2011

1. Verify that the Poisson kernel for the disc gives an approximation to the identity with $\delta = 1 - r$. (See Example 4 on p. 111 of S&S.)

2. Show that the Dirichlet kernel given by

$$D_N(\theta) = \frac{\sin((N + 1/2)\theta)}{\sin(\theta/2)},$$

has

$$\sup_N \int_{-\pi}^{\pi} |D_N(\theta)| \, d\theta = \infty.$$

Thus, for any choice of the parameter $\delta = f(N)$, with $\lim_{N\to\infty} f(N) = 0$, we do not have that D_N is a good kernel or an approximation to the identity.

3. S&S, pp. 195–198, #11, 19, 20, and 23.

September 13, 2011