Proposed solutions FWA January '07

1. Two translations, horizontal and vertical, produce the δ sequence, which has constant transform. The translations corresponds to a factor -1 in the second column and row respectively.

2. $\hat{f}(s) = \int |x|^{-\alpha} e^{-2\pi i x s}\, dx = (x = y/|s|) = |s|^{\alpha-n} \int |y|^{-\alpha} e^{-2\pi i y s/|s|}\, dy$, where the last integral is independent of s.

3. The equation expresses an orthogonality in C^2, which gives the properties of K.

4. Periodicity gives $\hat{f} = \sum_k a_k \delta_k$. $(1+e^{2\pi i x})(1+e^{2\pi i x})^{-1} = 1$ implies $(1+\tau_1)\hat{f} = \delta$. Thus $\hat{f} = \sum_{k \geq 0}(-1)^k \delta_k$ (corresponding to $f = \sum_{k \geq 0}(-1)^k e^{2\pi i k x}$).