

Translating DST-1 into DCT-2 for Franz

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We need the following matrices.

$$B_n = \begin{bmatrix} 1 & 1 & 1 & \cdot & \cdot & 1 \\ 1 & -1 & & & & \\ & 1 & -1 & & & \\ & & \cdot & \cdot & & \\ & & & 1 & -1 & \\ & & & & 1 & -1 \end{bmatrix},$$

$$D_n = I_1 \oplus \text{diag}_{0 \leq k < n-1}(\sin((k+1)(n+1)\pi)),$$

$$E_n = \text{diag}_{0 \leq k < n}(\cos(k\pi/(2n))).$$

Then

$$D \cdot E^{-1} \cdot \text{DCT-2}_n = (I_1 \oplus \text{DST-1}_{n-1}) \cdot B.$$