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AI assistance in harmonic analysis: a probabilistic Fourier extension theorem on the Knapp line, and two weight inequalities

(1) Open AI has recently proved the diagonal Fourier extension theorem in all dimensions, but the conjecture remains open on the Knapp line. L. Korobenko and C. Rios and I, with help from Claude, have obtained a relatively short and simple proof of the probabilistic analogue on the Knapp line. The randomization eliminates the difficult Kakeya issues and so does not shed much light on the remaining deterministic conjecture, but does provide some evidence for it.

(2) B. Wick and I have recently made improvements in the known two weight norm inequalities for singular integrals that were aided by Claude. One particular case is that the two weight norm inequality for the Hilbert transform is now known to hold if and only if the two dual local testing conditions hold as well as the classical Muckenhoupt condition - improving the previous result of Lacey et al that used the larger tailed Muckenhoupt conditions. We will include a discussion of the interesting interactions with Claude and harmonic analysis in these two cases.