# 9.1 Fourier transform and FFT

The simplest way to get a transform programme working is the obvious one: set up a uniformly-sampled scan of $sin(x)$, fitting a known number of several complete oscillations into the $x$ direction and using a scan length of $2^n$. Then transform this to see that you get but one amplitude in the Fourier plane at the right frequency or wavenumber; and transform back to ensure that the single amplitude and phase generated in the transform produces the sine wave identical to that with which you started. This simple technique works to check both a home-grown Fourier integration and an off-the shelf FFT routine. If the routine and reverse transform routine work properly for a simple sine wave, they'll work for anything. But don't believe this - generate a scan of pure Gaussian noise using say the Numerical Recipes routine *gasdev*, transform and reverse-transform to make sure that now a scan with all frequencies present can be recovered from its transform.