The following sums are guaranteed to be equal:

Eigenfunction sum:

$$\frac{1}{2\pi}\sum_{k=-\infty}^{\infty} e^{ikx}e^{-ik^2t}$$

Image sum:

$$\frac{1}{\sqrt{4\pi it}}\sum_{n=-\infty}^{\infty} e^{i(x-2\pi n)^2/4t}$$

(What these functions have to do with the Schrödinger equation will be explained early in our course.)

To evaluate the sums numerically, we have to replace $\pm\infty$ with some large integers $\pm N$. We plot both sums and increase N until the two curves almost agree, to be sure that we have taken enough terms.

Also, to make sure that the sums converge, we give t a small negative imaginary piece, $-ip$. This makes the terms in the sum decrease exponentially at large k and n. We are interested in the limit when $p \to 0$.

We will plot just the **real part** of the function, which reduces to the cosine sums on the Web page. The first part of the Maple session holds t fixed at various values and plots the resulting function of x. The second part of the Maple session (yielding the graphs on the Web page) sets $x = 0$ and plots the resulting function of the real part of t, with the imaginary part (the cutoff parameter) fixed at some small negative value.