The Dirac delta function is a very important distribution of functions that approximates the non-function

\[
\delta(x - x_o) = \begin{cases} 
\infty & \text{if } x = x_o \\
0 & \text{else}
\end{cases}.
\]  
(1)

The primary characteristic of this function is

\[
\int_{-\infty}^{\infty} \delta(x - x_o)f(x)dx = f(x_o).
\]  
(2)

One important example of a distribution of functions that approximates the Dirac delta function as \(\lim_{n \to \infty}\) is

\[
\delta_n(x) = \frac{\sin(nx)}{\pi x} = \frac{1}{2\pi} \int_{-n}^{n} e^{ixt}dt.
\]  
(3)

Here is a graph of a member of this distribution of functions.

![Graph of \(\frac{\sin(2500\times x)}{\pi \times x}\)](image)

Figure 1: An approximation of the Dirac delta function with \(n=2500\)