The Dirac delta function  $\delta(x)$  satisfies

$$\begin{cases} \delta(x) = 0 \text{ if } x \neq 0, \\ \int_{-\infty}^{\infty} \delta(x) dx = 1. \end{cases}$$

And for any function f(x), we have the equality

$$\int_{-\infty}^{\infty} \delta(x) f(x) dx = f(0).$$