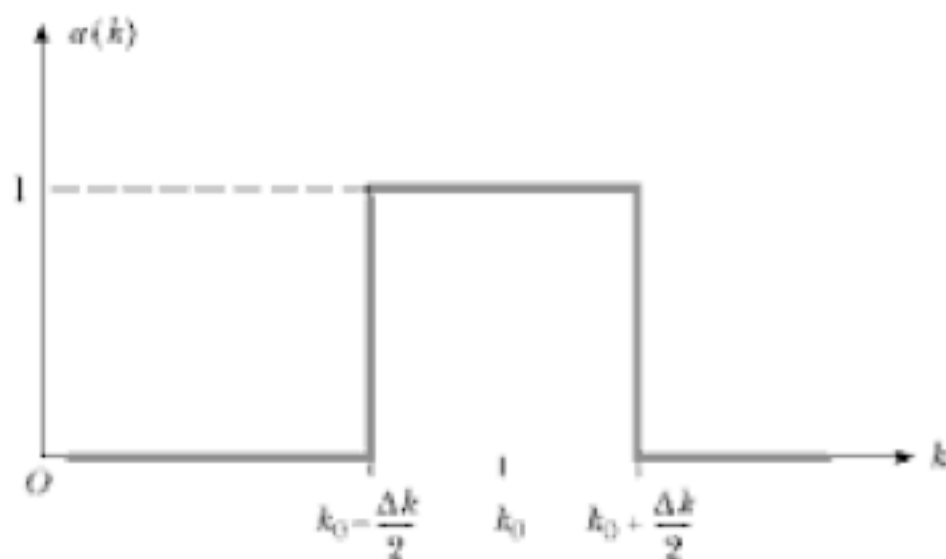


(a) Show that the matter wave packet whose amplitude distribution $a(k)$ is a rectangular pulse of height unity, width Δk , and centered at k_0 has the form

$$f(x) = \frac{\Delta k}{\sqrt{2\pi}} \frac{\sin(\Delta k \cdot x/2)}{(\Delta k \cdot x/2)} e^{ik_0 x}$$



A simple amplitude distribution specifying a uniform contribution of all wavenumbers from $k_0 - \Delta k/2$ to $k_0 + \Delta k/2$. Although we have used only positive k 's here, both positive and negative k values are allowed, in general corresponding to waves traveling to the right ($k > 0$) or left ($k < 0$).