$$p(s,x;t,I) = \varphi(t-s,x,I), \quad \varphi(\cdot,x,I)$$

$$p(s,x;t,I) = \int_I \delta(s,x;t,y)\,dy,$$

$$\delta(s,x;t,y) = \tilde{\delta}(t-s,x,y), \quad \tilde{\delta}(\cdot,x,y)$$

$$\tilde{\delta}(\cdot,x,y) = \hat{\delta}(\cdot,y-x), \quad \hat{\delta}(\cdot,\cdot)$$

$$\varphi(\cdot,x,I) \longrightarrow p(t,x,I)$$

$$p(s+t,x,I) = \int_{\mathbb{R}} p(s,x,dz)\,p(t,z,I) \qquad \text{C-K}$$

$$\delta(s,x;t,y) \longrightarrow p(s,x;t,y)$$

$$p(s,x;t,y) = \int_{\mathbb{R}} p(s,x;r,z)\,p(r,z;t,y)\,dz \qquad \text{C-K}$$

$$\tilde{\delta}(\cdot,x,y) \longrightarrow p(t,x,y)$$

$$p(s+t,x,y) = \int_{\mathbb{R}} p(s,x,z)\,p(t,z,y)\,dz \qquad \text{C-K}$$

$$\hat{\delta}(\cdot,\cdot) \longrightarrow p_t(x) \qquad p(t,x)$$

$$p_{s+t}(x) = \int_{\mathbb{R}} p_s(x-z)\,p_t(z)\,dz \qquad p_{s+t} = p_s * p_t \qquad \text{C-K}$$

$$p_t(x) = g_t(x) = \frac{1}{\sqrt{2\pi t}} e^{-\frac{x^2}{2t}}, \qquad p_t(x) = \frac{1}{\pi}\frac{t}{t^2+x^2}$$

$$\frac{1}{t}\frac{2}{\pi}\int_{\varepsilon}^{\infty}\frac{t\;dx}{t^2+x^2}=\frac{2}{\pi}\int_{\varepsilon}^{\infty}\frac{dx}{t^2+x^2}=\frac{1}{t}\frac{2}{\pi}\int_{\frac{\varepsilon}{t}}^{\infty}\frac{dy}{1+y^2}=\frac{1}{t}\frac{2}{\pi}\Big(\frac{\pi}{2}-\arctan\frac{\varepsilon}{t}\Big)$$

$$\frac{2}{\pi}\frac{\varepsilon}{t^2+\varepsilon^2}\longrightarrow\frac{2}{\pi\,\varepsilon}$$

$$\frac{2}{t}\int_{\varepsilon}^{\infty}\frac{1}{\sqrt{2\pi t}}e^{-\frac{x^2}{2t}}\,dx\leq\frac{2}{t}\int_{\varepsilon}^{\infty}\frac{x}{\varepsilon}\frac{1}{\sqrt{2\pi t}}e^{-\frac{x^2}{2t}}\,dx=2\Bigg[-\frac{1}{\varepsilon}\frac{1}{\sqrt{2\pi t}}e^{-\frac{x^2}{2t}}\Bigg]_{\varepsilon}^{\infty}=\frac{2}{\varepsilon}\frac{1}{\sqrt{2\pi t}}e^{-\frac{\varepsilon^2}{2t}}\to 0$$

$$\frac{e^{-\frac{\varepsilon^2}{2t}}}{\frac{1}{\sqrt{t}}}=\frac{\sqrt{t}}{e^{\frac{\varepsilon^2}{2t}}}$$

$$-\frac{1}{2\sqrt{t}}\frac{1}{e^{\frac{\varepsilon^2}{2t}}\frac{\epsilon^2}{t^2}}=-\frac{1}{2\varepsilon^2}\frac{t^{\frac{3}{2}}}{e^{\frac{\varepsilon^2}{2t}}}$$