Consider equation (7.80).

$$\chi(p) = \int_{-\infty}^{\infty} \chi(x) \exp\left(-\frac{ipx}{\hbar}\right)\, dx \tag{7.80a}$$

$$\psi(p) = \int_{-\infty}^{\infty} \psi(x) \exp\left(-\frac{ipx}{\hbar}\right)\, dx \tag{7.80b}$$

The associated inverse transforms are

$$\chi(x) = \frac{1}{2\pi\hbar}\int_{-\infty}^{\infty} \chi(p) \exp\left(\frac{ipx}{\hbar}\right)\, dp$$

$$\psi(x) = \frac{1}{2\pi\hbar}\int_{-\infty}^{\infty} \psi(p) \exp\left(\frac{ipx}{\hbar}\right)\, dp \tag{1}$$

Complex conjugate (7.80a).

$$\chi^*(p) = \int_{-\infty}^{\infty} \chi^*(x) \exp\left(\frac{ipx}{\hbar}\right)\, dx \tag{2}$$

By equation (1)

$$\frac{\hbar}{i}\frac{\partial\psi(x)}{\partial x} = \frac{1}{2\pi\hbar}\int_{-\infty}^{\infty} p\psi(p) \exp\left(\frac{ipx}{\hbar}\right)\, dp \tag{3}$$

Substitute (2) and (3) into (7.81).

$$\frac{1}{2\pi\hbar}\int_{-\infty}^{\infty} \chi^*(x)\left(\int_{-\infty}^{\infty} p\psi(p)\exp\left(\frac{ipx}{\hbar}\right)\, dp\right)\, dx$$
$$= \int_{-\infty}^{\infty}\left(\int_{-\infty}^{\infty} \chi^*(x)\exp\left(\frac{ipx}{\hbar}\right)\, dx\right) p\psi(p)\, \frac{dp}{2\pi\hbar}$$

By the distributive law the integrals are equivalent.

$$\frac{1}{2\pi\hbar}\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \chi^*(x)p\psi(p)\exp\left(\frac{ipx}{\hbar}\right)\, dp\, dx$$
$$= \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \chi^*(x)\exp\left(\frac{ipx}{\hbar}\right) p\psi(p)\, dx\, \frac{dp}{2\pi\hbar}$$