6.1.

(a). $\psi = \int \frac{f(\vec{x}',t')}{|\vec{x}-\vec{x}'|} d\vec{x}^{3\prime} = \int \frac{\delta(x')\delta(y')}{|\vec{x}-\vec{x}'|} \delta\left(t-\frac{|\vec{x}-\vec{x}'|}{c}\right) dx' dy' dz'$.

换作~~球坐标~~柱坐标：

$$= \int \frac{\delta\left(t-\frac{\sqrt{r^2+z'^2}}{c}\right)}{\sqrt{r^2+z'^2}} dz' = \int \frac{2\,\delta(z'-\sqrt{c^2t^2-r^2})}{\frac{z'}{c\cancel{\sqrt{r^2+z'^2}}}\cancel{\sqrt{r^2+z'^2}}} dz'$$

$$= \frac{2c\,\Theta(ct-r)}{\sqrt{c^2t^2-r^2}}$$

(b). $\psi = \int \frac{\delta(x')\delta\left(t-\frac{|\vec{x}-\vec{x}'|}{c}\right)}{|\vec{x}-\vec{x}'|} dx' dy' dz' = \int \frac{\delta\left(t-\frac{\sqrt{r'^2+x^2}}{c}\right)}{\sqrt{r'^2+x^2}} r' dr' d\phi'$.

$$= 2\pi \int \frac{\delta(r'-\sqrt{c^2t^2-x^2})}{\frac{r'}{\cancel{\sqrt{r'^2+x^2}}\,c}\cancel{\sqrt{r'^2+x^2}}} r' dr' = c\,2\pi\,\Theta(ct-x).$$