1) Verify that $h(t) = \int_{-\infty}^{\infty} H(f) e^{j2\pi f t} df$.

$$\begin{aligned}
h(t) &= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} h(t') e^{-j2\pi f t'} e^{j2\pi f t} dt' df \\
&= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} h(t') e^{j2\pi f (t-t')} dt' df \\
&= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} h(t') e^{jp(t-t')} \left(\frac{1}{2\pi}\right) dp dt' && \text{Let } p = 2\pi f \\
&= \int_{-\infty}^{\infty} h(t') \delta(t-t') dt' && \text{Since } 2\pi\delta(x-a) = \int_{-\infty}^{\infty} e^{ip(x-a)} dp \\
&= h(t)
\end{aligned}$$

2) Verify that if $h(t) = K, H(f) = K\delta(f)$ and that if $h(t) = K\delta(t), H(f) = K$.

3) Verify that if $h(t) = \sum\limits_{n=-\infty}^{\infty} \delta(t - nT), H(f) = \frac{1}{T} \sum\limits_{-\infty}^{\infty} \delta\left(f - \frac{n}{T}\right)$.

4) Verify that, if $h(t) \leftrightarrow H(f), h(t - t_0) \leftrightarrow H(f) e^{-j2\pi f t_0}$.

5) Verify that, if $h(t)$ is even, then $H(f)$ is real, and that if $h(t)$ is odd, then $H(f)$ is imaginary.

6) Verify that $x(t) * h(t) = \int_{-\infty}^{\infty} h(t) x(t - \tau) d\tau$.