Exercise 6.113

L **Answer (a).**

We are given that the function x has the magnitude spectrum M and phase spectrum P, where

$$M(\omega) = 1 \quad \text{and} \quad P(\omega) = \omega.$$

1 2

Let X denote the Fourier transform of x. From the definition of magnitude and phase spectra, we have

$$
\begin{aligned}
(3) \qquad X(\omega) &= M(\omega)e^{jP(\omega)} && \text{definition of magnitude and phase spectra}\\
&= 1e^{j\omega} && \text{substitute 1 and 2}\\
&= e^{j\omega}. && \text{drop 1}
\end{aligned}
$$

Taking the inverse Fourier transform of X, we obtain

$$
\begin{aligned}
x(t) &= \mathcal{F}^{-1}\left\{e^{j\omega}(1)\right\}(t) && \text{take inverse FT of 3}\\
&= \mathcal{F}^{-1}\{1\}(t+1) && \text{time shifting property}\\
&= \delta(t+1). && F^{-1}\delta = 1 \text{ (from FT table)}
\end{aligned}
$$