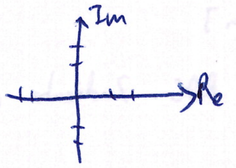
(2) E4. Problem 1.

(✓) c) $x[n] = \delta[n+1]$

$$\hat{x}(z) = \sum_{n=-\infty}^{\infty} \delta[n+1]\, z^{-n} = z^1 = \boxed{z = \hat{x}(z)}$$



ROC: $\boxed{\mathbb{C} \setminus \{\infty\}}$

$\{|z|=1\} \Rightarrow \boxed{\text{F.T. exists}}$

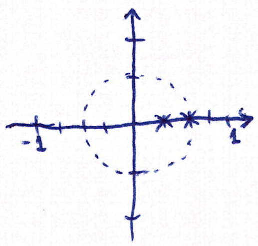
(d) →

✓ e ~~d~~) $x[n] = \begin{cases} \left(\frac{1}{2}\right)^n + \left(\frac{1}{4}\right)^n, & n \geq 0 \\ 0, & n < 0 \end{cases}$

$$\hat{x}(z) = \sum_{n=-\infty}^{\infty} x[n] z^{-n} = \underbrace{\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^n z^{-n}}_{\left(\frac{1}{2z}\right)^n} + \underbrace{\sum_{n=0}^{\infty} \left(\frac{1}{4}\right)^n z^{-n}}_{\left(\frac{1}{4z}\right)^n} = \frac{1}{1-\frac{1}{2z}} + \frac{1}{1-\frac{1}{4z}} = \cancel{\frac{2z}{2z-1} + \frac{4z}{4z-1}} =$$

$$\cancel{= \frac{2z(4z-1) + (2z-1)4z}{(4z-1)(2z-1)}}$$

$$= \boxed{\frac{1}{1-\frac{1}{2z}} + \frac{1}{1-\frac{1}{4z}} = \hat{x}(z)}$$



$1 - \frac{1}{2z} = 0 \Leftrightarrow \frac{1}{2z} = 1 \Leftrightarrow z = \frac{1}{2}$

$1 - \frac{1}{4z} = 0 \Leftrightarrow \frac{1}{4z} = 1 \Leftrightarrow z = \frac{1}{4}$

$\left.\begin{array}{l} \left|\frac{1}{2z}\right| < 1 \Leftrightarrow |z| > \frac{1}{2} \\ \left|\frac{1}{4z}\right| < 1 \Leftrightarrow |z| > \frac{1}{4} \end{array}\right\} \Rightarrow$ ROC $= \{|z| > \frac{1}{2} \cap |z| > \frac{1}{4}\} =$

$= \boxed{\{|z| > \frac{1}{2}\} = \text{ROC}}$

$\{|z| = 1\} \in \text{ROC} \Rightarrow \boxed{\text{F.T. exists}}$