Thm: Given μ is a constant, then

$$X_n \xrightarrow{p} \mu \iff X_n \xrightarrow{d} \mu$$

proof: "$\Rightarrow$" proved elsewhere

"$\Leftarrow$" $\because$ $X_n \xrightarrow{d} \mu$

$$\iff F_{X_n}(z) \to U(z-\mu), \ \forall z \neq \mu$$

$$\iff \forall a>0, \ \lim_{n\to\infty} F_{X_n}(\mu - a) = 0, \ \lim_{n\to\infty} F_{X_n}(\mu+a) = 1$$

$$\Rightarrow \forall a>0, \ \lim_{n\to\infty} P\{|X_n - \mu| \geq a\}$$

$$= \lim_{n\to\infty}\left[F_{X_n}(\mu-a) + 1 - F_{X_n}(\mu+a)\right]$$

$$= 0$$

$$\iff X_n \xrightarrow{p} \mu.$$

$\square$.