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TRUE or FALSE

The Root Test can be used to show that the series $\sum_{n=1}^{\infty} \frac{1}{n^n}$ is convergent

True ✓ $\lim_{n \rightarrow \infty} \sqrt[n]{\frac{1}{n^n}} = \lim_{n \rightarrow \infty} \frac{1}{n} = 0 = \rho$
 $\rho < 1 \Rightarrow$ convergent

TRUE or FALSE

The Ratio Test can be used to show that the series $\sum_{n=1}^{\infty} \frac{1}{n^2}$ is convergent

$\lim_{n \rightarrow \infty} \frac{\frac{1}{(n+1)^2}}{\frac{1}{n^2}} = \lim_{n \rightarrow \infty} \left(\frac{n}{n+1}\right)^2 = 1 = \rho$
 $\rho = 1$ the test cannot be used
 False ✓

Determine whether the series $\sum_{n=0}^{\infty} n e^{-n}$ is convergent or divergent

$\lim_{n \rightarrow \infty} \sqrt[n]{n e^{-n}} = \lim_{n \rightarrow \infty} \frac{\sqrt[n]{n}}{e} = \frac{1}{e} = e^{-1} = \rho$

$\rho < 1$

then by the Root Test

$\sum_{n=0}^{\infty} n e^{-n}$ converges.