

10. THE DEFIN OF THE LAPLACE TRANSFORM IS

$$\mathcal{L}\{f(t)\} = \int_0^{\infty} e^{-st} f(t) dt$$

$$\text{SO } \mathcal{L}\{e^{2t}\} = \int_0^{\infty} e^{-st} e^{2t} dt$$

$$= \lim_{T \rightarrow \infty} \int_0^T e^{2t-st} dt$$

$$= \lim_{T \rightarrow \infty} \int_0^T e^{(2-s)t} dt$$

$$= \lim_{T \rightarrow \infty} \left[ \frac{1}{2-s} e^{(2-s)t} \right]_0^T$$

$$= \frac{1}{2-s} \lim_{T \rightarrow \infty} \left[ e^{(2-s)T} - 1 \right]$$

$$= \frac{1}{2-s} [0 - 1]$$

$$= \frac{1}{s-2}$$