Daily Laplace - 3/31

① $\mathcal{L}\{(t+1)^2 u_2(t)\}$ w/ frequency domain

$= \mathcal{L}\{[(t-2)+3]^2 u_2(t)\}$

$= e^{-2s}\mathcal{L}\{(t+3)^2\}$

$= e^{-2s}\mathcal{L}\{t^2+6t+9\}$

$= e^{-2s}\left(\frac{2}{s^3}+\frac{6}{s^2}+\frac{9}{s}\right)$; $s>0$

(used only the frequency domain of formula $\mathcal{L}\{t^n\}$, all $s>0$).

② $\mathcal{L}\{(t+1)e^{2t}u_2(t)\}$ w/ frequency domain

$= \mathcal{L}\left\{[(t-2)+3]e^{2[(t-2)+2]}u_2(t)\right\}$

$= e^{-2s}\mathcal{L}\left\{(t+3)e^{2(t+2)}\right\}$

$= e^{-2s}\mathcal{L}\{(t+3)e^{2t}\}\cdot e^4$

$= e^{-2s+4}\left(\mathcal{L}\{t+3\}\big|_{s\to s-2}\right)$

$= e^{-2s+4}\left(\frac{1}{(s-2)^2}+\frac{3}{s-2}\right)$ $(s>2)$

(used the frequency of $\mathcal{L}\{t^n\}$, $s>0$, shifted to $s-2>0$)