SHIFTING PRACTICE

1. $g(t) = \mathcal{L}^{-1}\left(\frac{s}{s^2+1} e^{-3s}\right) = \cos(t-3)\,\mathcal{U}(t-3)$

$\downarrow$ $\quad\quad\quad\quad\quad\quad\quad\quad \nwarrow$

$F(s) = \frac{s}{s^2+1} \rightarrow f(t) = \cos t$

2. $g(t) = \mathcal{L}^{-1}\left(\frac{1}{(s+2)^2} e^{-4s}\right) = (t-4)e^{-2(t-4)}\,\mathcal{U}(t-4)$

$\downarrow$

$\frac{1}{s^2} \rightarrow t$

$\frac{1}{(s+2)^2} \rightarrow t e^{-2t}$ $\nearrow$

3. $g(t) = \mathcal{L}^{-1}\left(\frac{s+4}{(s+4)^2+9} e^{-7s}\right) = e^{-4(t-7)} \cos 3(t-7)\,\mathcal{U}(t-7)$

$\downarrow$

$\frac{s}{s^2+9} \rightarrow \cos 3t$

$\frac{s+4}{(s+4)^2+9} \rightarrow e^{-4t}\cos 3t$ $\nearrow$