7.2 2, 3, 12, 13, 17, 30

Solutions

2) $F(s) = \int_0^\infty e^{-st} t^2 \, dt = \frac{2}{s^3} \quad s > 0$

3) $F(s) = \int_0^\infty e^{-st} e^{6t} \, dt = \int_0^\infty e^{-(s-6)t} \, dt = -\frac{e^{-(s-6)t}}{s-6} \Big|_0^\infty$

$= \frac{1}{s-6}$ for $s > 6$

12) $F(s) = \begin{cases} \int_0^3 e^{-st} e^{2t} \, dt = \int_0^3 e^{(2-s)t} \, dt = \frac{e^{(2-s)t}}{2-s} \Big|_0^3 \\ = \frac{e^{(2-s)3}}{2-s} - \frac{1}{2-s} \text{ for } s > 2 \\ \int_3^\infty e^{-st} \, dt = -\frac{e^{-st}}{t} \Big|_3^\infty = \frac{e^{-3s}}{3} \text{ for } s > 0 \end{cases}$

13) $\mathcal{L}\{e^{-3t}\} = \frac{1}{s+3} \quad s > -3$

$\mathcal{L}\{t^2\} = \frac{2}{s^3}$

$\mathcal{L}\{t\} = \frac{1}{s^2}$

$\mathcal{L}\{1\} = \frac{1}{s}$

$\mathcal{L}\{6e^{-3t} - t^2 + 2t - 8\} = \frac{6}{s+3} - \frac{2}{s^3} + \frac{2}{s^2} - \frac{8}{s} \quad s > 0$

17) $\mathcal{L}\{e^{3t} \sin 6t\} = \frac{6}{(s-3)^2 + 36} \quad s > 3$

$\mathcal{L}\{t^3\} = \frac{6}{s^4} \quad s > 0$

$\mathcal{L}\{e^t\} = \frac{1}{s-1} \quad s > 1$

$\mathcal{L}\{e^{3t} \sin 6t - t^3 + e^t\} = \frac{6}{(s-3)^2 + 36} - \frac{6}{s^4} + \frac{1}{s-1} \quad s > 3$

30) All zero