

$$\begin{aligned} > \text{eq1} := \frac{s}{(s+3)^2} + \frac{2 \cdot (s+2)}{(s-1) \cdot (s+3)^2} - \frac{2}{(s^2+4) \cdot (s+3)^2}; \\ \text{eq1} &:= \frac{s}{(s+3)^2} + \frac{2(s+2)}{(s-1)(s+3)^2} - \frac{2}{(s^2+4)(s+3)^2} \end{aligned} \quad (1)$$

$$\begin{aligned} > \text{eq2} := \text{simplify}(\%); \\ \text{eq2} &:= \frac{s^4 + s^3 + 8s^2 + 2s + 18}{(s+3)^2 (s-1) (s^2+4)} \end{aligned} \quad (2)$$

$$\begin{aligned} > \text{eq3} := \text{convert}(\text{eq2}, \text{parfrac}, s); \\ \text{eq3} &:= \frac{3}{8(s-1)} + \frac{1}{169} \frac{12s-10}{s^2+4} - \frac{69}{26(s+3)^2} + \frac{749}{1352(s+3)} \end{aligned} \quad (3)$$

$$\begin{aligned} > \text{with}(\text{intrans}) : \\ > \text{invlaplace}(\text{eq3}, s, t); \\ \frac{3}{8} e^t + \frac{12}{169} \cos(2t) - \frac{5}{169} \sin(2t) - \frac{1}{1352} e^{-3t} (3588t - 749) \end{aligned} \quad (4)$$

$$\begin{aligned} > \text{eq4} := \frac{(2 \cdot s + 9)}{(s+3)^2} + \frac{2}{(s-1) \cdot (s+3)^2} + \frac{2 \cdot (s+4)}{(s^2+4) \cdot (s+3)^2}; \\ \text{eq4} &:= \frac{2s+9}{(s+3)^2} + \frac{2}{(s-1)(s+3)^2} + \frac{2(s+4)}{(s^2+4)(s+3)^2} \end{aligned} \quad (5)$$

$$\begin{aligned} > \text{eq5} := \text{simplify}(\%); \\ \text{eq5} &:= \frac{2s^4 + 7s^3 + 3s^2 + 34s - 36}{(s+3)^2 (s-1) (s^2+4)} \end{aligned} \quad (6)$$

$$\begin{aligned} > \text{eq6} := \text{convert}(\text{eq5}, \text{parfrac}, s); \\ \text{eq6} &:= \frac{1}{8(s-1)} + \frac{1}{169} \frac{-38s+88}{s^2+4} + \frac{69}{26(s+3)^2} + \frac{2839}{1352(s+3)} \end{aligned} \quad (7)$$

$$\begin{aligned} > \text{invlaplace}(\text{eq4}, s, t); \\ \frac{1}{8} e^t - \frac{38}{169} \cos(2t) + \frac{44}{169} \sin(2t) + \frac{1}{1352} e^{-3t} (2839 + 3588t) \end{aligned} \quad (8)$$

$$\begin{aligned} > \text{de1} := \text{diff}(y1(t), t) = -4 \cdot y1(t) - y2(t) + 2 \cdot \exp(t); \\ \text{de1} &:= \frac{d}{dt} y1(t) = -4y1(t) - y2(t) + 2e^t \end{aligned} \quad (9)$$

$$\begin{aligned} > \text{de2} := \text{diff}(y2(t), t) = y1(t) - 2 \cdot y2(t) + \sin(2 \cdot t); \\ \text{de2} &:= \frac{d}{dt} y2(t) = y1(t) - 2y2(t) + \sin(2t) \end{aligned} \quad (10)$$

$$\begin{aligned} > \text{sysde} := \text{de1}, \text{de2}; \text{ics} := y1(0) = 1, y2(0) = 2; \\ \text{sysde} &:= \frac{d}{dt} y1(t) = -4y1(t) - y2(t) + 2e^t, \frac{d}{dt} y2(t) = y1(t) - 2y2(t) + \sin(2t) \\ \text{ics} &:= y1(0) = 1, y2(0) = 2 \end{aligned} \quad (11)$$

$$\begin{aligned} > \text{dsolve}([\text{sysde}, \text{ics}]); \\ \left\{ y1(t) = \frac{749}{1352} e^{-3t} - \frac{69}{26} e^{-3t} t + \frac{3}{8} e^t + \frac{12}{169} \cos(2t) - \frac{5}{169} \sin(2t), y2(t) = \frac{2839}{1352} e^{-3t} \right. \\ \left. + \frac{69}{26} e^{-3t} t + \frac{1}{8} e^t + \frac{44}{169} \sin(2t) - \frac{38}{169} \cos(2t) \right\} \end{aligned} \quad (12)$$

