4.06bc*

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b)

$$\frac{3s+5}{s^3+3s^2+2s} = \frac{3s+5}{s(s+2)(s+1)} = \frac{A}{s} + \frac{B}{s+2} + \frac{C}{s+1} =$$

$$= \frac{5}{2s} - \frac{1}{2(s+2)} - \frac{2}{s+1}$$

$$\frac{5}{2}\theta(t) - \frac{1}{2}e^{-2t}\theta(t) - 2e^{-t}\theta(t) =$$

$$= \left(\tfrac{5}{2} - \tfrac{1}{2}e^{-2t} - 2e^{-t}\right)\theta(t)$$

c)

$$\frac{s^3-5s}{s^2+4s+3} = \frac{s(s^2-5)}{(s+1)(s+3)} = s\left(\frac{A}{s+1} + \frac{B}{s+3} + C\right)$$

$$s^2 - 5 = s^2(C) + s(A+B+4C) + (3A+B+3C)$$

$$\begin{cases} C = 1 \\ A+B+4C = 0 \\ 3A+B+3C = -5 \end{cases} \Leftrightarrow \begin{cases} C = 1 \\ A+B = -4 \\ 3A+B = -8 \\ A = -2 \\ B = -2 \end{cases}$$

$$s\left(-\frac{2}{s+1} - \frac{2}{s+3} + 1\right) = sF(s) \Leftrightarrow$$

$\Leftrightarrow f'(t)$, $f(t) = \delta(t) = 1$ $f'(t) = \delta'(t) \leftrightarrow s$

$$-\frac{2s}{s+1} - \frac{2s}{s+3} + s =$$

$$= -\frac{2(s+1)}{s+1} + \frac{2}{s+1} - \frac{2(s+3)}{(s+3)} + \frac{6}{s+3} + s =$$

$$= -4 + \frac{2}{s+1} + \frac{6}{s+3} + s =$$

$$= -4\delta(t) + 2\cdot e^{-t}\theta(t) + 6e^{-3t}\theta(t) + \delta'(t)$$