$$f_1(t) = 3t^4 - 5t^3 + 8$$

$$\mathcal{L}(f_1(t)) = \mathcal{L}(3t^4 - 5t^3 + 8) = 3\,\underline{\mathcal{L}(t^4)} - 5\,\underline{\mathcal{L}(t^3)} + 8\,\underline{\mathcal{L}(1)} =$$

$$= 3 \cdot \frac{24}{s^5} - 5 \cdot \frac{6}{s^4} + 8 \cdot \frac{1}{s} = \frac{72}{s^5} - \frac{30}{s^4} + \frac{8}{s} = F_1(s)$$

slovník: $\mathcal{L}(1) = \frac{1}{s}$

$$\mathcal{L}(t^4) = \frac{24}{s^5}$$

$$\mathcal{L}\left(\frac{t^4}{4!}\right) = \frac{1}{s^5} \rightarrow \frac{1}{4!}\,\underline{\underline{\mathcal{L}(t^4)}} = \frac{1}{s^5} \quad / \cdot 4!$$

$$\mathcal{L}(t^4) = \frac{4!}{s^5} = \frac{24}{s^5}$$

$$\mathcal{L}(t^3) = \frac{6}{s^4}$$

$$\mathcal{L}\left(\frac{t^3}{3!}\right) = \frac{1}{s^4}$$

$$f_2(t) = e^{5t}$$

$$\mathcal{L}(e^{5t}) = \frac{1}{s-5}$$

$$f_3(t) = e^{-2t}\cos 5t$$

$$\mathcal{L}(e^{-2t}\cos 5t) = \frac{s+2}{(s+2)^2+25}$$

$$f_4(t) = t \sin 5t$$

$$\mathcal{L}(t\sin 5t) = \frac{10s}{(s^2+25)^2}$$

$$\frac{1}{10}\mathcal{L}\left(\frac{t\sin 5t}{10}\right) = \frac{s}{(s^2+25)^2}$$

$$f_5(t) = t^7 e^{-3t}$$

$$\mathcal{L}\left(t^7 e^{-3t}\right) = \frac{7!}{(s+3)^8}$$

$$\mathcal{L}\left(\frac{t^7 e^{-3t}}{7!}\right) = \frac{1}{(s+3)^8}$$

Zpětná Laplaceova transformace

$$F_1(s) = \frac{1}{(s+1)^3}$$

$$\mathcal{L}^{-1}\left(\frac{1}{(s+1)^3}\right) = \frac{t^2 e^{-t}}{2!}$$

$$F_2(s) = \frac{1}{(s+2)(s-1)}$$

$a=2 \quad b=-1$

$$\mathcal{L}^{-1}\left(\frac{1}{(s+2)(s-1)}\right) = \frac{e^{-2t} - e^{t}}{-1-\cancel{1}2} =$$

$$= \frac{e^{-2t} - e^{t}}{-3}$$

$$F_3(s) = \frac{s}{(s-2)(s+3)} = \frac{A}{s-2} + \frac{B}{s+3} = \frac{A(s+3) + B(s-2)}{(s-2)(s+3)} =$$

$$= \frac{As + Bs + 3A - 2B}{(s-2)(s+3)} =$$

u $s: \; 1 = A + B \; / \cdot 2$

u $s^0: \; 0 = 3A - 2B$

$2 = 5A \rightarrow A = \frac{2}{5} \qquad B = \frac{3}{5}$

$$= \frac{\frac{2}{5}}{s-2} + \frac{\frac{3}{5}}{s+3} =$$

$$= \frac{2}{5} \cdot \frac{1}{s-2} + \frac{3}{5} \frac{1}{s+3}$$

$$\mathcal{L}^{-1}\left(\frac{2}{5}\frac{1}{s-2} + \frac{3}{5}\frac{1}{s+3}\right) = \frac{2}{5}\mathcal{L}^{-1}\left(\frac{1}{s-2}\right) + \frac{3}{5}\mathcal{L}^{-1}\left(\frac{1}{s+3}\right) =$$

$$= \frac{2}{5} e^{2t} + \frac{3}{5} e^{-3t}$$

$$F_4(s) = \frac{1}{s^2+4s+5} = \frac{1}{(s+2)^2+1}$$

$$\mathcal{L}^{-1}\left(\frac{1}{(s+2)^2+1}\right) = e^{-2t}\sin t$$

$$F(s) = \frac{1}{s^2-5s+6} = \frac{1}{(s-2)(s-3)} \qquad \mathcal{L}^{-1}\left(\frac{1}{s^2-5s+6}\right) = \frac{e^{2t}-e^{3t}}{-3-(-2)}$$

$$F(s) = \frac{1}{s^2+4s+4} = \frac{1}{(s+2)^2} \qquad \mathcal{L}^{-1}\left(\frac{1}{(s+2)^2}\right) = \frac{te^{-2t}}{1!} = te^{-2t}$$