$$\mathcal{L}\{f(t)\} = F(s) \qquad \mathcal{L}\{f(t)\} = F(p)$$

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

$$= \mathcal{L}^{-1}\left\{\frac{s}{\left(s^2+s+\frac{1}{4}\right)+\left(1-\frac{1}{4}\right)}\right\}$$

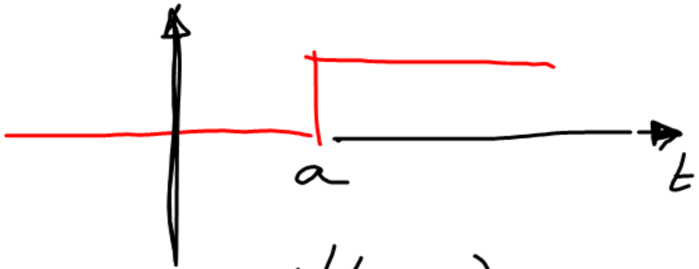
$$= \mathcal{L}^{-1}\left\{\frac{s}{\left(s+\frac{1}{2}\right)^2+\left(\frac{\sqrt{3}}{2}\right)^2}\right\}$$

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

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

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

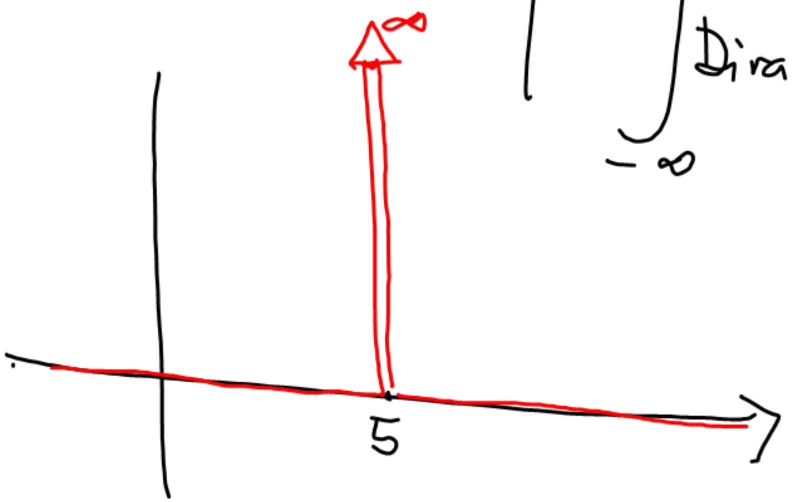
$$\mathcal{L}^{-1}\left\{\frac{s}{s^2+s+1}\right\} = e^{-\frac{1}{2}t}\cos\left(\frac{\sqrt{3}}{2}t\right) - \frac{1}{\sqrt{3}}e^{-\frac{1}{2}t}\operatorname{sen}\left(\frac{\sqrt{3}}{2}t\right)$$



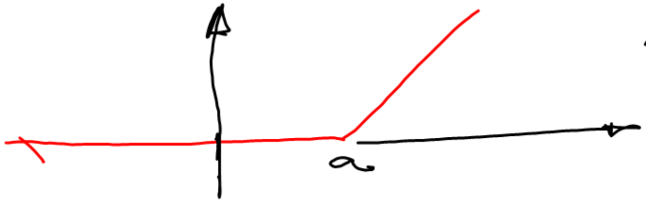
$u(t-a)$

$$\mathcal{L}\{u(t-a)\} = \frac{e^{-as}}{s}$$

$$\text{Dirac}(t-5) = \begin{cases} 0 \,; & t \neq 5 \\ \displaystyle\int_{-\infty}^{\infty} \text{Dirac}(t-5)\,dt = 1 \end{cases}$$

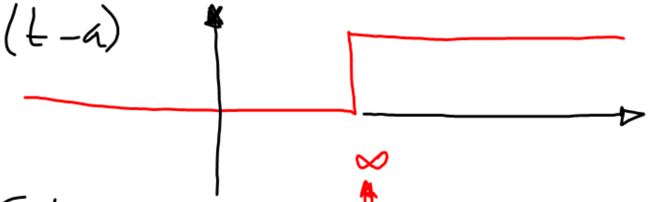


$r(t-a)$



$$R = \frac{e^{-5s}}{s^2}$$

$$\frac{dr}{dt} = u(t-a)$$



$$U = \frac{e^{-5s}}{s}$$

$$\frac{du}{dt} = \delta(t-a)$$

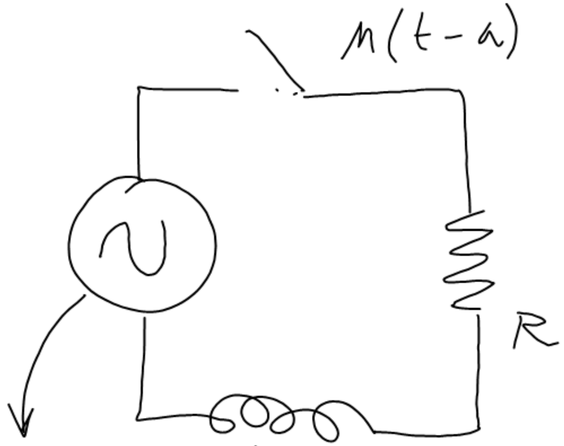
$$D = e^{-5s}$$

$$\mathcal{L}^{-1}\left\{\frac{e^{-5s}}{s^2}\right\} \qquad \mathcal{L}^{-1}\left\{\frac{d}{dt}\frac{e^{-5s}}{s^2}\right\} = s\,\mathcal{L}^{-1}\left\{\frac{e^{-5s}}{s^2}\right\} - f(0)$$

$$= \mathcal{L}^{-1}\left\{\frac{e^{-3s}}{s}\right\}$$

$$\mathcal{L}^{-1}\left\{\frac{d}{dt}\frac{e^{-5s}}{s}\right\} = s\,\mathcal{L}\left\{\frac{e^{-5s}}{s}\right\} - f(0)$$

$$\mathcal{L}^{-1}\left\{\frac{d}{dt}\frac{e^{-5s}}{s}\right\} = \mathcal{L}^{-1}\left\{e^{-5s}\right\}$$



$$L\frac{di}{dt}+Ri = \qquad i(0)=0$$

$$= u(t-a)\,117\cos(60\pi t).$$

$F(t)=117\cos(60(\pi t)).$

$L=0.001$ Henry.
$R=10$ Ohm.
$i(0)=0$ amp.

$$\mathcal{L}\left\{0.001\frac{di}{dt}+10i\right\}=\mathcal{L}\left\{u(t-5)\cdot 117\cos(60\pi t)\right\}$$

$$0.001\left\{sI(s)-(0)\right\}+10I(s)=117\left(\frac{se^{-5s}}{s^2+(60\pi)^2}\right)$$

$$sI(s)+10\,000\,I(s)=+\frac{117se^{-5s}}{s^2+(3600\pi^2)}$$

$$I(s)=\frac{+117se^{-5s}}{s^2+(3600\pi^2)\cdot(s+10000)}$$

$$I(s)=\frac{A}{s+10,000}+\frac{Bs+D}{s^2+(3600\pi^2)}$$

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$$\mathcal{L}\{f(t)\} = \int_0^\infty e^{-st} f(t)\,dt.$$

TEMA 3.- Sistemas EDOL

$$\boxed{\begin{aligned} \frac{dx_1(t)}{dt} &= 2x_1(t)+3x_2(t)+4t^2 \\ \frac{dx_2(t)}{dt} &= x_1(t)+4x_2(t)+2e^{3t} \end{aligned}}$$

$$x_1(t)=\frac{dx_2(t)}{dt}-4x_2(t)-2e^{3t}$$

$$\frac{dx_1(t)}{dt}=\frac{d^2x_2(t)}{dt^2}-4\frac{dx_2(t)}{dt}-6e^{3t}$$

$$\left[\frac{d^2x_2}{dt}-4\frac{dx_2}{dt}-6e^{3t}\right]=2\left[\frac{dx_2}{dt}-4x_2-2e^{3t}\right]+3x_2+4t^2$$

$$\boxed{\frac{d^2x_2}{dt}-6\frac{dx_2}{dt}+5x_2=4t^2+2e^{3t}}$$