$f:[0,\infty)\to\mathbb{R}.$

LAPLACETRANSFORMASJONEN

$$F(s)=\mathcal{L}[f(t)](s)=\int_0^\infty e^{-st}f(t)\,dt$$

f STYKKEVIS KONT

$|f(t)|\le Me^{kt}\quad \forall t\ge 0.$

$F(s)$ EKSISTERER FOR $s>k$.

f KONT.

f' STYKKEVIS KONT.

$$\mathcal{L}[e^{at}f(t)](s)=F(s-a)$$
FOR $s-a>k$

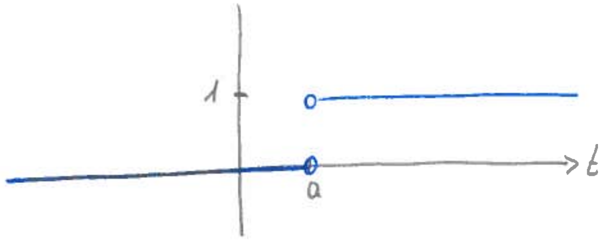
$$\mathcal{L}\left[\int_0^t f(\tau)\,d\tau\right](s)=\frac{1}{s}F(s)$$
FOR $s>k$
$s>0$

$$\mathcal{L}[f'(t)](s)=s\mathcal{L}[f(t)](s)-f(0).$$
FOR $s>k$

$\mathcal{L}[af(t)+bg(t)](s)=a\mathcal{L}[f(t)](s)+b\mathcal{L}[g(t)](s)$ FOR $s>k$.

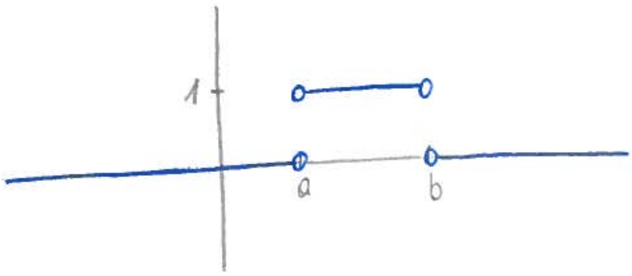
FOR $a,b\in\mathbb{R}$, $f,g:[0,\infty)\to\mathbb{R}$ SLIK AT $F(s),G(s)$ EKS. FOR $s>k$.

HEAVISIDE FUNKSJONEN $u(t-a)$ $(a \geq 0)$



$$\Rightarrow \mathcal{L}[u(t-a)](s) = \frac{1}{s}e^{-as} \quad (s>0)$$

$u(t-a) - u(t-b)$ $(a \leq b)$



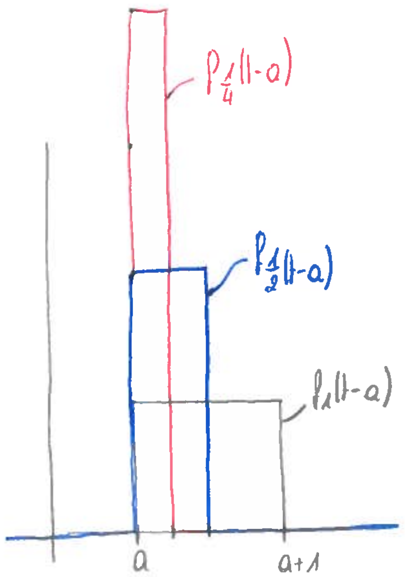
f STYKKEVIS KONT
$|f(t)| \leq Me^{kt}$ $\forall t \geq 0$.

$$f(t-a)u(t-a) = \begin{cases} 0 & \text{FOR } t<a \\ f(t-a) & \text{FOR } t>a \end{cases}$$

$\mathcal{L}[f(t-a)u(t-a)](s) = e^{-as}F(s)$
FOR $s>k$.

DIRACS DELTAFUNKSJON:

$$p_k(t-a) = \begin{cases} \frac{1}{k} & \text{FOR } a \le t \le a+k \\ 0 & \text{ELLERS} \end{cases} \quad (k>0,\ a\ge 0)$$



DIRACS DELTAFUNKSJON

$$\delta(t-a) = \lim_{k\to 0} p_k(t-a)$$

g(t) KONTINUERLIG

$$\int_0^\infty g(t)\delta(t-a)\,dt = g(a)$$

$$\mathcal{L}[\delta(t-a)](s) = e^{-as}$$

$f(t), g(t)$ STYKKEVIS KONT.

$|f(t)|, |g(t)| \leq Me^{kt} \quad \forall t \geq 0$

KONVOLUSJONEN

$$h(t) = (f * g)(t) = \int_0^t f(\tau)g(t-\tau)\,d\tau.$$

$\mathcal{L}$.

$H(s) = F(s)G(s)$ FOR $s > k$.

$f(t)$ STYKKEVIS KONT

$|f(t)| \leq Me^{kt} \quad \forall t \geq 0.$

$F(s)$ EKSISTERER FOR $s > k$.

$-F'(s) = \mathcal{L}[t f(t)](s)$

FOR $s > k$

$\lim_{t \to 0} \frac{f(t)}{t}$ EKSISTERER.

$$\int_s^\infty F(\tilde{s})\,d\tilde{s} = \mathcal{L}\left[\frac{f(t)}{t}\right](s).$$

FOR $s > k$.

DIFFLIG.

$$
\begin{tikzcd}[column sep=huge, row sep=huge]
\begin{array}{c} ay''(t)+by'(t)+cy(t)=r(t) \\ y(0)=\dots \\ y'(0)=\dots \end{array} \arrow[r, "\mathcal{L}"] \arrow[d] & a\mathcal{L}[y''(t)](s)+b\mathcal{L}[y'(t)](s)+c\mathcal{L}[y(t)](s)=\mathcal{L}[r(t)](s) \arrow[d, "\begin{array}{l} \mathcal{L}[y'](s)=sY(s)-y(0) \\ \mathcal{L}[y''](s)=s^2Y(s)-sy(0)-y'(0) \end{array}"] \\
y(t)=\dots & Y(s)=\dfrac{R(s)+(as+b)y(0)+ay'(0)}{as^2+bs+c} \arrow[l, "\begin{array}{c} \text{DELBRØKOPP} \\ + \\ \mathcal{L}^{-1} \end{array}"']
\end{tikzcd}
$$

$$
\begin{tikzcd}[column sep=huge, row sep=huge]
\begin{array}{c} ay''(t)+by'(t)+cy(t)=r(t) \\ y'(0)=y(0)=0 \end{array} \arrow[r, "\mathcal{L}"] \arrow[d] & (as^2+bs+c)Y(s)=R(s) \arrow[d, "Q(s)=\frac{1}{as^2+bs+c}"] \\
y(t)=\displaystyle\int_0^t r(\tau)q(t-\tau)\,d\tau & Y(s)=R(s)Q(s) \arrow[l, "\begin{array}{c} q(t)=\mathcal{L}^{-1}[Q(s)](t) \\ + \\ \mathcal{L}[(r*q)(t)](s)=R(s)Q(s) \end{array}"']
\end{tikzcd}
$$