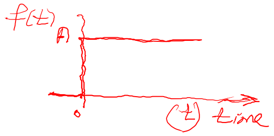
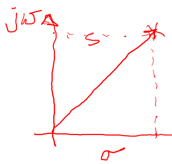
$\boxed{f(t) = A \;;\; t \geq 0}$



$\mathcal{L}[A] = \frac{A}{s}$

$= \sqrt{b^2 - 4ac}$



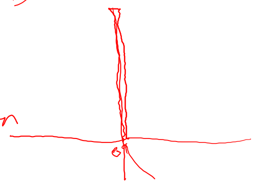
Real part

Complex variable

$\boxed{s = \sigma + j\omega}$

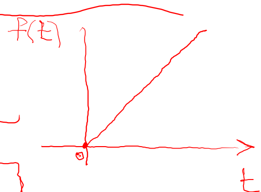
$f(t) = \delta(t) \;;\; t \geq 0$

$=$ Impulse Function



$\mathcal{L}[f(t)] = \mathcal{L}[\delta(t)] = 1$

$f(t) = t$

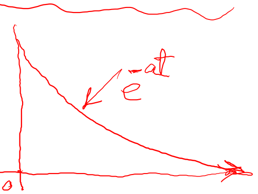


$\mathcal{L}[f(t)] = \mathcal{L}[t] = \frac{1}{s^2}$

$\boxed{= \int_0^\infty t\, e^{-st}\, dt}$

$f(t) = e^{-at} \;;\; t \geq 0$

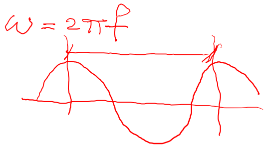
$\frac{1}{e^{at}}$



$\mathcal{L}[f(t)] = \mathcal{L}[e^{-at}] = \frac{1}{s+a}$

$= \mathcal{L}[5e^{-2t}] = \boxed{\frac{5}{s+2}}$

$f(t) = \cos(\omega t)$ $\qquad \omega = 2\pi f$



$\mathcal{L}[f(t)] = \mathcal{L}[\cos(\omega t)]$

$\boxed{= \frac{s}{s^2 + \omega^2}}$

Q) Find the Laplace transform of the following Function f(t)

$\boxed{f(t) = e^{-3t} + 3\cos(4t)}$

$f(t) = e^{-3t} + 3\cos(4t)$

$\mathcal{L}[e^{-3t}] = \frac{1}{s+3}$

$\mathcal{L}[3\cos(4t)] = \frac{3s}{s^2+16}$

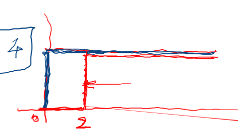
$= \frac{1}{s+3} + \frac{3s}{s^2+16}$

$= \frac{s^2+16+3s^2+9s}{(s+3)(s^2+16)}$

$= \frac{4s^2+9s+16}{(s+3)(s^2+16)}$

$\boxed{f(t) = 2 - t}$

$\boxed{A = 4}$



$\mathcal{L}[2] = \frac{2}{s}$

$\mathcal{L}[t] = \frac{1}{s^2}$

$= \frac{2}{s} - \frac{1}{s^2}$

$= -\frac{4}{s} e^{-2s}$

$f(t) = e^{-3t} \cdot (4)$ A

$\mathcal{L}[4e^{-3t}] \Longrightarrow \frac{4}{\cancel{s}(s+3)}$

$f(t) = \int e^{-3t}\, dt$

$\mathcal{L}[e^{-3t}] = \frac{1}{s+3}$

$\mathcal{L}f(t) = \frac{1}{s(s+3)}$

$f(t)$ $\mathcal{L}\left[\boxed{\frac{d^2y}{dt^2} + 12\frac{dy}{dt} + 8y(t) = 6}\right]$

$\boxed{s^2Y(s) + 12sY(s) + 8Y(s) = \frac{6}{s}}$

$\mathcal{L}[6] = \frac{6}{s}$

$(s^2 + \cancel{12}^{\,6}s + 8)Y(s) = \frac{6}{s}$

$\boxed{Y(s) = \frac{6}{s(s^2+12s+8)}}$

$\boxed{\frac{d^2y}{dt^2} + 12\frac{dy}{dt} + 8y(t) = 6}$

$\mathcal{L}\left[\frac{d^2y}{dt^2}\right] = s^2Y(s) \;;\; \mathcal{L}\left[12\frac{dy}{dt}\right] = 12sY(s)$

$\mathcal{L}^{-1}Y(s)$

$= \frac{6}{s(s^2+6s+8)} = \frac{6}{s(s+2)(s+4)}$

$\boxed{y(t) = a_1(A) + a_2 e^{-2t} + a_3 e^{-4t}}$