المحاضرة الثانية كونترول

انواع التحويل ~ ال s-domain

$\delta(t) = 1$

$u(t) = \frac{1}{s}$

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

$t^n = \frac{n!}{s^{n+1}}$

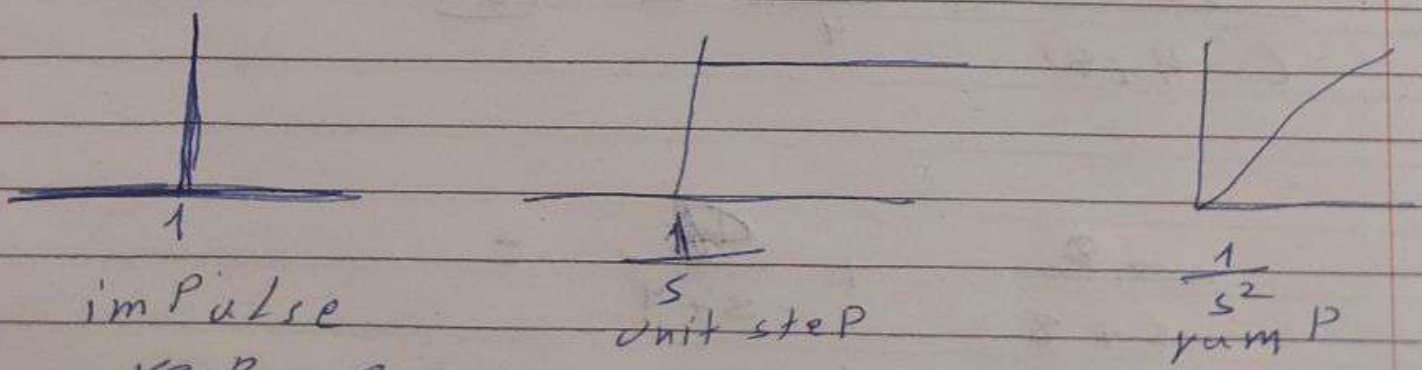
$e^{-at} = \frac{1}{s+a}$

$\sin(wt) = \frac{w}{s^2 + w^2}$

$\cos(wt) = \frac{s}{s^2 + w^2}$

$\frac{dy}{dt} = s$

$\int dt = \frac{1}{s}$



impulse response

unit step

ramp

Ex:

Solve DE

$$\frac{d^2y}{dt^2} + 12\frac{dy}{dt} + 32 = 32x(t)$$

$$y(s)(s^2 + 12s + 32) = 32x(s)$$

$$\frac{y(s)}{x(s)} = \frac{32}{s^2 + 12s + 32}$$

$$\frac{32}{(s+8)(s+4)}$$

$$\frac{32}{(s+8)(s+4)} = \frac{A}{s+8} + \frac{B}{s+4}$$

$$A = \underset{s=-8}{\frac{32}{(s+4)}} = \frac{32}{(-8+4)} = \frac{32}{-4} = \boxed{-8}$$

$$B = \underset{s=-4}{(s+4)} \times \frac{32}{(s+8)(s+4)} \Rightarrow \frac{32}{(s+8)} \Rightarrow$$

$$\frac{32}{(-4+8)} = \frac{32}{4} = \boxed{8}$$

$$\frac{-8}{s+8} + \frac{8}{s+4} =$$

$$y(t) = (-8e^{-8t} + 8e^{-4t})\,u(t)$$

ex:

$$t^2 \cdot e^{-2t} = \frac{2}{s^3} \times \frac{1}{(s+2)} = \frac{2}{(s+2)^3}$$