

If  $f(a) = 0$  then

$P.I = \frac{1}{f(D)} e^{ax}$  and let  $f(D)$  is of ~~degree~~ powers

Hence  $P.I = \frac{x^\alpha}{\alpha} e^{ax}$

### Examples

I  $(D^2 - 3D + 2)y = e^{3x}$

$\therefore$  for CF,  $D^2 - 3D + 2 = 0 \Rightarrow D = 1, 2.$

$\therefore$  CF =  $C_1 e^x + C_2 e^{2x}$

$P.I = \frac{1}{D^2 - 3D + 2} e^{3x}$

$= e^{3x} \cdot \frac{1}{3^2 - 3 \times 3 + 2} = \frac{1}{2} e^{3x}$

Replace D by 3  
 as  $e^{ax} = e^{ax} \Rightarrow a=3$

$\therefore$  complete soln = CF + P.I =  $C_1 e^x + C_2 e^{2x} + \frac{1}{2} e^{3x}.$