$\left(\because \frac{1}{f(D)} e^{ax} F(x) = e^{ax} \frac{1}{f(D+a)} F(x) \right)$

$F(x)$=미분가능,

$$y_p = e^{-3x} \frac{1}{(D-3+3)^2} \sin x = e^{-3x} \frac{1}{D^2} \sin x = e^{-3x}(-1^2)\sin x = -e^{-3x}\sin x$$

$\therefore$ General solution: $y = e^{-3x}\{C_1 + C_2 x\} - e^{-3x}\sin x$

(2) $y'' - 3y' + 2y = xe^x$

$\Rightarrow (D^2 - 3D + 2)y = xe^x$

① $y_h = C_1 e^{2x} + C_2 e^x$ $\quad (\because y = e^{\lambda x},\ \lambda^2 + (-3\lambda) + 2 = 0 \quad \lambda = 2, 1)$

② $y_p = \frac{1}{D^2-3D+2} xe^x = \frac{1}{(D-2)(D-1)} xe^x = \frac{1}{D-2} xe^x - \frac{1}{D-1} xe^x$

$= e^x \frac{1}{D-1} x - e^x \frac{1}{D} x$

$= e^x\{e^x \int xe^{-x}dx\} - e^x \cdot \frac{1}{2}x^2$

$= e^{2x}\{-xe^{-x} + \int e^{-x}dx\} - \frac{1}{2}x^2 e^x$

$= -xe^x - e^x - \frac{1}{2}x^2 e^x = -e^x\{\frac{1}{2}x^2 + x + 1\}$

미 적

$x \quad e^{-x}$

$1 \quad -e^{-x}$

$\int xe^{-x}dx$

$-xe^{-x} + \int e^{-x}dx$

$\therefore$ General solution: $y = C_1 e^{2x} + C_2 e^x - e^x\{\frac{1}{2}x^2 + x + 1\}$