(8) $(D^2D' - 2DD'^2 + D'^3)y = 1/x^2$.

$D'(D^2 - 2DD' + D'^2)y = 0$

C.F $\Rightarrow$ $\phi_1(y+x) + x\phi_2(y+x) + \phi_3(x)$

P.I $\Rightarrow$ $\frac{1}{(D-D')^2} \cdot \frac{1}{D'} \times \frac{1}{x^2} = \frac{1}{(D-D')^2} \frac{y}{x^2}$.

$\frac{1}{D^2\left(1-\frac{D'}{D}\right)^2}\left(\frac{y}{x^2}\right) = \frac{\left(1-\frac{D'}{D}\right)^{-2}}{D^2}\left(\frac{y}{x^2}\right)$

$= \frac{1}{D^2}\left[1 + \frac{2D'}{D} + \cdots\right]\left(\frac{y}{x^2}\right)$.

$= \frac{1}{D^2}\left[\frac{y}{x^2} + \frac{2}{D}\left(\frac{1}{x^2}\right)\right] = \frac{1}{D^2}\left(\frac{y}{x^2} - \frac{2}{x}\right)$.

$= \frac{1}{D}\left(-\frac{y}{x} - 2\log x\right) = -y\log x - 2\int \log x\,dx$.

$= \boxed{-y\log x - 2x\log x + 2x}$ Ans

$\boxed{(1+x)^{-n} = 1 - nx + {}^nC_2 x^2 - {}^nC_3 x^3}$

$(1+x)^m = 1 + mx + \cdots$

$\forall m$ +ve or -ve