

Answer on Question #77342, Math / Differential Equations

$$(x + 2)y'' + xy' - y = 0$$

We can notice that  $y = x$  — the solution. Then, according to Liouville's formula

$$\begin{aligned} \begin{vmatrix} y & x \\ y' & 1 \end{vmatrix} &= Ce^{-\int \frac{x}{x+2} dx} \\ y - xy' &= Ce^{-x+2\log|x+2|} \\ \frac{y - xy'}{x^2} &= \frac{C(x+2)^2 e^{-x}}{x^2} \\ -\left(\frac{y}{x}\right)' &= \frac{C(x+2)^2 e^{-x}}{x^2} \\ -\frac{y}{x} &= C\left(-\frac{e^{-x}(x+4)}{x} + D\right) \\ y &= Ce^{-x}(x+4) + Dx \end{aligned}$$