

$$(4) \quad y' + 2y = 4x + (4x - 11)e^{2x}$$

$$\text{Hom} : y' + 2y = 0 \quad \boxed{y_H = Ae^{-2x} \text{ ou } A \in \mathbb{R}}$$

Solution particulière pour le second membre  $4x$  :  $y_1 = ax + b$

$$y_1' = a \quad y_1' + 2y_1 = a + 2(ax + b) = 2ax + (a + 2b) = 4x$$

$$\Rightarrow \begin{cases} 2a = 4 \\ a + 2b = 0 \end{cases} \Rightarrow \begin{cases} a = 2 \\ 2b = -2 \end{cases} \Rightarrow b = -1 \quad \boxed{y_1 = 2x - 1}$$

Solution particulière pour le second membre  $(4x - 11)e^{2x}$  :  $y_2 = (ax + b)e^{2x}$

$$y_2' = ae^{2x} + 2(ax + b)e^{2x}$$

$$y_2' + 2y_2 = ae^{2x} + (ax + 2b)e^{2x} + (2ax + 2b)e^{2x} = (4ax + a + 4b)e^{2x} = (4x - 11)e^{2x}$$

$$\Rightarrow \begin{cases} 4a = 4 \\ 4x - 11 = a + 4b \end{cases} \Rightarrow \begin{cases} a = 1 \\ 4b = -12 \end{cases} \Rightarrow \begin{cases} a = 1 \\ b = -3 \end{cases} \quad \boxed{y_2 = (x - 3)e^{2x}}$$

Solutions de l'éq complète :

$$y = y_H + y_1 + y_2$$

← principe de superposition

$$\boxed{y = Ae^{-2x} + 2x - 1 + (x - 3)e^{2x} \text{ ou } A \in \mathbb{R}}$$