(a) Express $\dfrac{-2}{x(x+1)}$ in partial fractions. **2**

(b) Use integration by parts to find $\int xe^{3x}dx$. **3**

(c) Using your answers to (a) and (b), solve

$$\frac{dy}{dx} - \frac{2y}{x(x+1)} = \frac{x^3 e^{3x}}{(x+1)^2}.$$ **5**

Answers:

(a) $-\dfrac{2}{x} + \dfrac{2}{x+1}$

(b) $\dfrac{1}{3}xe^{3x} - \dfrac{1}{9}e^{3x} + c$

(c) $y = \dfrac{x^2}{(x+1)^2}\left(\dfrac{1}{3}xe^{3x} - \dfrac{1}{9}e^{3x} + c\right)$