

Advanced Higher Maths  
SQA 2024 Paper 2  
Question 13



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

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

Answers:

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

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

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