4: Given that $y = \lambda x e^{3x}$ is a particular integral of the differential equation

$$4\frac{d^2y}{dx^2} - 11\frac{dy}{dx} - 3y = 78e^{3x}$$

(a) determine the value of the constant λ

(3)

(b) Hence determine the general solution of the differential equation.

(3)

Given also that $y = \frac{9}{2}$ and $\frac{dy}{dx} = 0$ at $x = 0$

(c) determine the particular solution of the differential equation.

(4)

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Question 4 continued

(Total for Question 4 is 10 marks)