4. (a) Show that the substitution $y^2 = \frac{1}{t}$ transforms the differential equation

$$\frac{dy}{dx} + y = xy^3 \qquad \text{(I)}$$

into the differential equation

$$\frac{dt}{dx} - 2t = -2x \qquad \text{(II)}$$

(3)

(b) Solve differential equation (II) and determine y^2 in terms of x.

(6)

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Question 4 continued

(Total for Question 4 is 9 marks)