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Parametric Equation | Past Paper Question | Q5 Edexcel Specimen

A curve C has parametric equations $x = 2t - 1$, $y = 4t - 7 + \frac{3}{t}$, $t \neq 0$ Show that the Cartesian equation of the curve C can be written in the form $y = \frac{ax^2 + bx + c}{x + 1}$, $x \neq -1$ where a and b are integers to be found.

The handwritten solution shows the following steps:

$$x = 2t - 1 \quad (1)$$
$$y = 4t - 7 + \frac{3}{t} \quad (2)$$

from (1) $t = \frac{x+1}{2} \quad (3)$

Sub (3) into (2)

$$\therefore y = \frac{2(x+1)}{2} - 7 + \frac{3}{\frac{x+1}{2}}$$
$$= 2x + 2 - 7 + \frac{6}{x+1}$$
$$\therefore y = \frac{(2x-5)(x+1) + 6}{x+1}$$
$$= \frac{2x^2 - 3x + 1}{x+1}$$
$$\equiv \frac{2x^2 + ax + b}{x+1}$$

where $a = -3$, $b = 1$

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