4. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

The curve C has equation

$$4x^2 + y^2 - 2xy = 24x$$

(a) Find $\frac{dy}{dx}$ giving your answer in simplest form in terms of x and y.

(5)

The point P lies on C.

Given that

- the gradient of C at P is 2
- P has coordinates (a, b) where $a > 0$ and $b > 0$

(b) find the value of a and the value of b.

(5)

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Question 4 continued

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Question 4 continued

(Total for Question 4 is 10 marks)

5. The line l_1 has equation

$$\mathbf{r} = \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 4 \\ 2 \end{pmatrix}$$ where λ is a scalar parameter

The line l_2 has equation

$$\mathbf{r} = \begin{pmatrix} -1 \\ \beta \\ 6 \end{pmatrix} + \mu \begin{pmatrix} 2 \\ -1 \\ 7 \end{pmatrix}$$ where β is a constant and μ is a scalar parameter

Given that l_1 and l_2 intersect at the point P

(i) find the value of β

(ii) find the coordinates of P

(6)

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