1. $$f(x) = \frac{2+11x}{(1+x)(2+5x)}$$

(a) Write $f(x)$ in partial fraction form.

(3)

(b) Using

- the answer to part (a)
- appropriate binomial series expansions

find the first 3 terms, in ascending powers of x, of the series expansion of $f(x)$.
Write the answer in simplest form.

(5)

(c) State the range of values of x for which the expansion in part (b) is valid.

(1)

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Question 1 continued

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Question 1 continued

(Total for Question 1 is 9 marks)

2. With respect to a fixed origin O, the lines l_1 and l_2 are given by the equations

$$l_1: \quad \mathbf{r} = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ -1 \\ 5 \end{pmatrix} \qquad l_2: \quad \mathbf{r} = \begin{pmatrix} 6 \\ 12 \\ -5 \end{pmatrix} + \mu \begin{pmatrix} 4 \\ -3 \\ 10 \end{pmatrix}$$

where λ and μ are scalar parameters.

(a) With reference to the equations, explain why l_1 and l_2 are not parallel.

(1)

(b) Prove by contradiction that l_1 and l_2 do not intersect.

(5)

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