3. The first four terms of a sequence are

$$3,\ -6,\ u_3,\ -24,\ ...$$

(a) Decide, showing detailed reasoning, whether the sequence could be

(i) an arithmetic sequence,

(ii) a geometric sequence.

State, for each part, the value of u_3 if such a sequence is possible.

(6)

(b) Given instead that

- the sequence is periodic of period 4
- $\sum_{i=1}^{50} u_i = 141$

find the value of u_3

(3)

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Question 3 continued

Question 3 continued

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Question 3 continued

(Total for Question 3 is 9 marks)

4. **In this question you must show detailed reasoning.**

(i) Show by counterexample that the statement

"$\mathrm{f}(n) = \frac{5}{2}n^3 - \frac{5}{2}n^2 - 19n + 20$ is a perfect cube for all positive integers n"

is **not** true.

(3)

(ii) Prove that the following statement is true

"$(x + 1)^2 > 6x - 4$ for all real x"

(3)

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