BBMerlion

Math A Level

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QUIZ 1

Partial Fraction

Function and Graph

Sequence and Series

Question 1

Express the following as a sum of partial fractions.

a. $\frac{2x+5}{(x-2)(x+1)}$

b. $\frac{5x^2+17x+15}{(x+2)^2(x+1)}$

c. $\frac{x}{(x^2-x+1)(3x-2)}$

d. $\frac{2x^4+3x^2+1}{x^2+3x+2}$

Question 2

a. Find the composite function $(f \circ g)(x)$ and $(g \circ f)(x)$ if

$$f(x) = \frac{1-x}{1+x};\ 0 \leq x \leq 1$$
$$g(x) = 4x(1-x); 0 \leq x \leq 1$$

b. Let $f(x) = x^2 - 3x$. Determine $g(x)$ so that $(f \circ g)(x) = x^2 + x - 2$

c. Find the inverse of the following functions:

$$f(x) = -\frac{9x-3}{7x+6}$$
$$g(x) = 3x^5 - 9$$
$$h(x) = \sqrt[3]{9x-7}$$

Question 3

a. Sketch the graph of the curve

$$y = \frac{x^2 + 1}{(x - 1)(x - 2)}$$

carefully labeling any turning points and asymptotes.

b. The parabola $x = y^2 + ay + b$ crosses the parabola $y = x^2$ at (1, 1) making right angles. Calculate the values of a and b and sketch both functions on the same plane.

Question 4

- a. Write out the 6th to 10th terms of the following sequences and describe the sequence using the word convergent or divergent, along with the reason.

$$u_1 = 16 \; and \; u_{n+1} = -\frac{1}{2}U_n$$

b. Write down the general term, and evaluate

$$1000 + 1331 + 1728 + \cdots + 4913$$

Question 4

c. Use mathematical induction to prove De Moivre's theorem

$$\left(R(\cos t + i \sin t)\right)^n = R^n(\cos nt + i \sin nt)$$

References

Thomas Calculus Early Transcedentals 12th Edition