

Integration of Rational Functions Exam Questions

Q1, (OCR 4724, Jun 2006, Q3)

(i) Express $\frac{3-2x}{x(3-x)}$ in partial fractions. [3]

(ii) Show that $\int_1^2 \frac{3-2x}{x(3-x)} dx = 0$. [4]

(iii) What does the result of part (ii) indicate about the graph of $y = \frac{3-2x}{x(3-x)}$ between $x = 1$ and $x = 2$? [1]

Q2, (OCR 4724, Jan 2007, Q6)

(i) Express $\frac{2x+1}{(x-3)^2}$ in the form $\frac{A}{x-3} + \frac{B}{(x-3)^2}$, where A and B are constants. [3]

(ii) Hence find the exact value of $\int_4^{10} \frac{2x+1}{(x-3)^2} dx$, giving your answer in the form $a + b \ln c$, where a , b and c are integers. [4]

Q3, (OCR 4724, Jun 2009, Q6)

The expression $\frac{4x}{(x-5)(x-3)^2}$ is denoted by $f(x)$.

(i) Express $f(x)$ in the form $\frac{A}{x-5} + \frac{B}{x-3} + \frac{C}{(x-3)^2}$, where A , B and C are constants. [4]

(ii) Hence find the exact value of $\int_1^2 f(x) dx$. [5]

Q4, (OCR 4724, Jun 2007, Q7)

(i) Find the quotient and the remainder when $2x^3 + 3x^2 + 9x + 12$ is divided by $x^2 + 4$. [4]

(ii) Hence express $\frac{2x^3 + 3x^2 + 9x + 12}{x^2 + 4}$ in the form $Ax + B + \frac{Cx + D}{x^2 + 4}$, where the values of the constants A , B , C and D are to be stated. [1]

(iii) Use the result of part (ii) to find the exact value of $\int_1^3 \frac{2x^3 + 3x^2 + 9x + 12}{x^2 + 4} dx$. [5]
