



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]

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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]

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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]

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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]

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