## C3 Chapter 1 Algebraic Fractions

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Given that	
$2x^4 - 3x^2 + x + 1$ $dx + e$	
$\frac{2x^4 - 3x^2 + x + 1}{(x^2 - 1)} \equiv (ax^2 + bx + c) + \frac{dx + e}{(x^2 - 1)},$	
find the values of the constants $a$ , $b$ , $c$ , $d$ and $e$ .	
ind the values of the constants w, s, e, w and e.	(4)

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1.11.	

2.	$f(x) = \frac{2x+2}{x^2-2x-3} - \frac{x+1}{x-3}$	
	a single fraction in its simplest form.	(4)
(b) Hence show that	$t f'(x) = \frac{2}{(x-3)^2}$	(3)

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	$\frac{x+1}{3x^2-3} - \frac{1}{3x+1}$	
as a single fraction in its		
as a single fraction in its	simplest form.	(4)

2. (a) Express

$$\frac{4x-1}{2(x-1)} - \frac{3}{2(x-1)(2x-1)}$$

as a single fraction in its simplest form.

**(4)** 

Given that

$$f(x) = \frac{4x-1}{2(x-1)} - \frac{3}{2(x-1)(2x-1)} - 2, \quad x > 1,$$

(b) show that

$$f(x) = \frac{3}{2x - 1}$$

**(2)** 

(c) Hence differentiate f(x) and find f'(2).

(3)


$$f(x) = \frac{4x-5}{(2x+1)(x-3)} - \frac{2x}{x^2-9}, \qquad x \neq \pm 3, \ x \neq -\frac{1}{2}$$

(a) Show that

$$f(x) = \frac{5}{(2x+1)(x+3)}$$

**(5)** 

The curve C has equation y = f(x). The point  $P\left(-1, -\frac{5}{2}\right)$  lies on C.

(b) Find an equation of the normal to C at P.

(8)

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2	f(x) = 2x + 3	9 + 2x	1
<b>4.</b>	$\frac{1}{x} = \frac{1}{x+2}$	$-\frac{9+2x}{2x^2+3x-2},$	$x > \frac{\pi}{2}$

( )	Show that $f(x) = \frac{4x-6}{2x-1}$ .	
(a)	Show that $f(x) = \frac{1}{2x-1}$ .	
	2x-1	(7)

(b)	Hence, or otherwise, find $f'(x)$ in its simplest form.	
		(3)

7. The function f is defined by

$$f(x) = 1 - \frac{2}{(x+4)} + \frac{x-8}{(x-2)(x+4)}, \quad x \in \mathbb{R}, \ x \neq -4, \ x \neq 2$$

(a) Show that  $f(x) = \frac{x-3}{x-2}$  (5)

The function g is defined by

$$g(x) = \frac{e^x - 3}{e^x - 2}, \quad x \in \mathbb{R}, \ x \neq \ln 2$$

- (b) Differentiate g(x) to show that  $g'(x) = \frac{e^x}{(e^x 2)^2}$  (3)
- (c) Find the exact values of x for which g'(x) = 1 (4)

(a) Simplify fully	
(a) Simplify fully $2x^2 + 9x - 5$	
$\frac{2x^2 + 9x - 5}{x^2 + 2x - 15}$	(2)
<del></del>	(3)
Given that	
$\ln(2x^2+9x-5) = 1 + \ln(x^2+2x-15),  x \neq -5,$	
$m(2x+3x+3)$ 1+ $m(x+2x+13)$ , $x \neq -3$ ,	
(b) find x in terms of e.	(4)
	(4)

(4)

2. 
$$f(x) = 1 - \frac{3}{x+2} + \frac{3}{(x+2)^2}, \ x \neq -2.$$

- (a) Show that  $f(x) = \frac{x^2 + x + 1}{(x+2)^2}, x \neq -2.$
- (b) Show that  $x^2 + x + 1 > 0$  for all values of x. (3)
- (c) Show that f(x) > 0 for all values of  $x, x \neq -2$ .

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