4: The function f(x) is defined by

$$f(x) = ax^3 + bx^2 + 5x - 3$$

where a and b are constants.

Given that $(x + 3)$ is a factor of f(x),

(a) show that

$$b = 3a + 2$$

(2)

Given further that when f(x) is divided by $(2x - 1)$ the remainder is $\frac{7}{4}$

(b) find the value of a and the value of b.

(4)

(c) Using algebra, find the quotient and the remainder when f(x) is divided by $(x - 2)$

(3)

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Question 4 continued

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Question 4 continued

(Total for Question 4 is 9 marks)

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5:

x	–2	–0.5	1	2.5	4	5.5	**7**
y	12	4.243	1.5	0.530	0.188	0.066	0.023

The table above shows corresponding values of x and y for

$$y = 3\left(\frac{1}{2}\right)^x$$

The values of y are given to 3 decimal places as appropriate.

(a) Using the trapezium rule with all the values of y in the given table, obtain an estimate for

$$\int_{-2}^{7} 3\left(\frac{1}{2}\right)^x \mathrm{d}x$$

giving the answer to one decimal place.

(3)

Using the answer to part (a) and making your method clear, estimate

(b) (i) $\displaystyle\int_{-2}^{7} 3\left(\frac{1}{2}\right)^{x+2} \mathrm{d}x$

(ii) $\displaystyle\int_{-2}^{7} \left(2^{-x} + 2x\right) \mathrm{d}x$

(3)

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