5 Given that $(2 + 3x)^{-1}$ can be expressed in the form $p(1 + qx)^{-1}$ where p and q are constants,

(a) find the value of p and the value of q

(2)

(b) Hence expand $(2 + 3x)^{-1}$ in ascending powers of x up to and including the term in x^3, expressing each coefficient as an exact fraction in its lowest terms.

(3)

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

(c) Obtain a series expansion for $f(x)$, in ascending powers of x up to and including the term in x^3, expressing each coefficient as an exact fraction in its lowest terms.

(2)

(d) Hence use algebraic integration to obtain an estimate, to 4 decimal places, of

$$\int_0^{0.5} f(x)\, dx$$

(4)

Question 5 continued

P 7 1 6 6 1 A 0 1 3 3 2

Question 5 continued

P 7 1 6 6 1 A 0 1 4 3 2

Question 5 continued

(Total for Question 5 is 11 marks)

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