9 (a) Expand $(1 + 2x)^{-\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3 expressing each coefficient as a fraction in its lowest terms.

(3)

(b) Find the range of values of x for which your expansion is valid.

(1)

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

(c) Obtain a series expansion of f (x) in ascending powers of x up to and including the term in x^3
Give your coefficients in terms of k where appropriate.

(3)

The coefficient of x^3 in the series expansion of f (x) is $-\frac{8}{3}$

(d) Find the exact value of k

(2)

(e) Hence, using algebraic integration, estimate the value of

$$\int_{0.1}^{0.2} f(x)\, dx$$

Give your answer to 4 decimal places.

(5)

Question 9 continued

Question 9 continued

Question 9 continued

(Total for Question 9 is 14 marks)