9 (a) Expand, in ascending powers of x up to and including the term in x^3, simplifying each term as far as possible,

(i) $(1 + x)^{-1}$

(ii) $(1 - 2x)^{-1}$

(4)

Given that $\dfrac{2}{1-2x} + \dfrac{1}{1+x} = \dfrac{Ax + B}{(1-2x)(1+x)}$

(b) find the value of A and the value of B.

(2)

(c) (i) Obtain a series expansion for $\dfrac{1}{(1-2x)(1+x)}$ in ascending powers of x up to and including the term in x^2

(ii) State the range of values of x for which this expansion is valid.

(4)

(d) Use your series expansion from part (c) to obtain an estimate, to 3 decimal places, of $\displaystyle\int_{0.1}^{0.2} \frac{1}{(1-2x)(1+x)}\,\mathrm{d}x$

(4)

Question 9 continued

Question 9 continued

Question 9 continued

(Total for Question 9 is 14 marks)