3. $f(x) = \left(2 + \frac{kx}{8}\right)^7$ where k is a non-zero constant

(a) Find the first 4 terms, in ascending powers of x, of the binomial expansion of $f(x)$. Give each term in simplest form.

(4)

Given that, in the binomial expansion of $f(x)$, the coefficients of x, x^2 and x^3 are the first 3 terms of an arithmetic progression,

(b) find, using algebra, the possible values of k.

(*Solutions relying entirely on calculator technology are not acceptable.*)

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

(Total for Question 3 is 7 marks)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

4. (i) Using the laws of logarithms, solve

$$\log_3(4x) + 2 = \log_3(5x + 7)$$

(3)

(ii) Given that

$$\sum_{r=1}^{2} \log_a\left(y^r\right) = \sum_{r=1}^{2} \left(\log_a y\right)^r \qquad y > 1, a > 1, y \neq a$$

find y in terms of a, giving your answer in simplest form.

(3)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA