3. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

(i) Using the laws of logarithms, solve

$$2\log_2(2-x) = 4 + \log_2(x+10)$$

(5)

(ii) Find the value of

$$\log_{\sqrt{a}} a^6$$

where a is a positive constant greater than 1

(1)

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Question 3 continued

(Total for Question 3 is 6 marks)

4. $f(x) = (x - 2)(2x^2 + 5x + k) + 21$

where k is a constant.

(a) State the remainder when $f(x)$ is divided by $(x - 2)$

(1)

Given that $(2x - 1)$ is a factor of $f(x)$

(b) show that $k = 11$

(2)

(c) Hence

(i) fully factorise $f(x)$,

(ii) find the number of real solutions of the equation

$$f(x) = 0$$

giving a reason for your answer.

(5)

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