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**1.** **In this question you must show all stages of your working.**

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

$$f(x) = \frac{2x^3 - 4x - 15}{x^2 + 3x + 4}$$

(a) Show that

$$f(x) \equiv Ax + B + \frac{C(2x + 3)}{x^2 + 3x + 4}$$

where $A$, $B$ and $C$ are integers to be found.

**(4)**

(b) Hence, find

$$\int_3^5 f(x)\,dx$$

giving your answer in the form $p + \ln q$, where $p$ and $q$ are integers.

**(5)**

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**Question 1 continued**

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**Question 1 continued**

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**Question 1 continued**

**Q1**

**(Total 9 marks)**

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**2.** The functions f and g are defined by

$$f(x) = 5 - \frac{4}{3x + 2} \qquad x \geqslant 0$$

$$g(x) = \left| 4\sin\left(\frac{x}{3} + \frac{\pi}{6}\right) \right| \qquad x \in \mathbb{R}$$

(a) Find the range of f

**(2)**

(b) (i) Find $f^{-1}(x)$

(ii) Write down the domain of $f^{-1}$

**(3)**

(c) Find $fg(-\pi)$

**(2)**

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