5. The equation $5x^2 - 4x + 2 = 0$ has roots $\frac{1}{p}$ and $\frac{1}{q}$

(a) Without solving the equation,

(i) show that $pq = \frac{5}{2}$

(ii) determine the value of $p + q$

(4)

(b) Hence, without finding the values of p and q, determine a quadratic equation with roots

$$\frac{p}{p^2 + 1} \text{ and } \frac{q}{q^2 + 1}$$

giving your answer in the form $ax^2 + bx + c = 0$ where a, b and c are integers.

(5)

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Question 5 continued

(Total for Question 5 is 9 marks)