4 The curve C has equation $y = 2x^2 + px + q$ where p and q are integers.

The curve C has a stationary point at $(3, -5)$

(a) Show that $p = -12$ and find the value of q

(4)

(b) State, giving a reason, the nature of the stationary point.

(1)

(c) Find an equation of the normal to C at the point on C where $x = 1$

Give your answer in the form $ax + by + c = 0$

(6)

Question 4 continued

(Total for Question 4 is 11 marks)

5 y and x vary so that $y = xe^{-2x}$

Given that the value of x increases by 3%, use calculus to find, in terms of x, an estimate for the percentage change in y
Give your answer in the form $a(b - cx)$ where a, b and c are integers.

(6)

Question 5 continued

(Total for Question 5 is 6 marks)