3. The rectangular hyperbola H has Cartesian equation $xy = 9$

The point P with coordinates $\left(3t, \frac{3}{t}\right)$, where $t \neq 0$, lies on H

(a) Use calculus to determine an equation for the normal to H at the point P

Give your answer in the form $ty - t^3x = \mathrm{f}(t)$

(4)

Given that $t = 2$

(b) determine the coordinates of the point where the normal meets H again.

Give your answer in simplest form.

(3)

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Question 3 continued

(Total for Question 3 is 7 marks)