

1. [March/2022/Paper_9709/22/No.2](#)

A curve has equation $y = 7 + 4 \ln(2x + 5)$.

Find the equation of the tangent to the curve at the point $(-2, 7)$, giving your answer in the form $y = mx + c$. [5]

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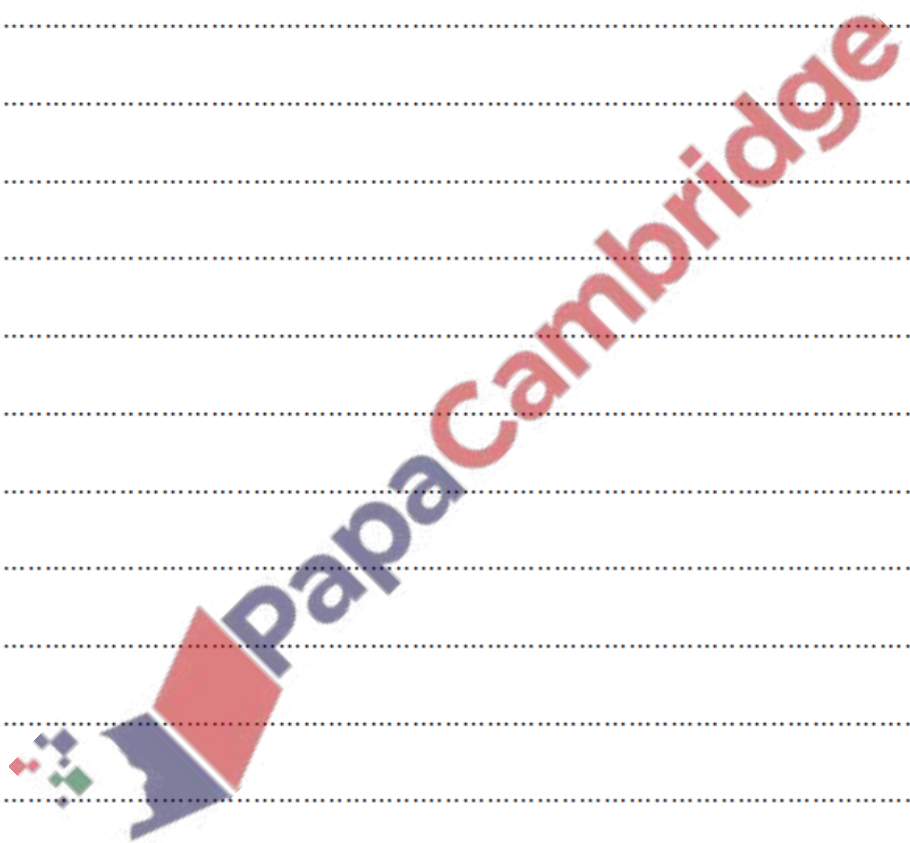
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(b) Hence find the value of x when $y = 36$. Give your answer correct to 3 significant figures. [2]

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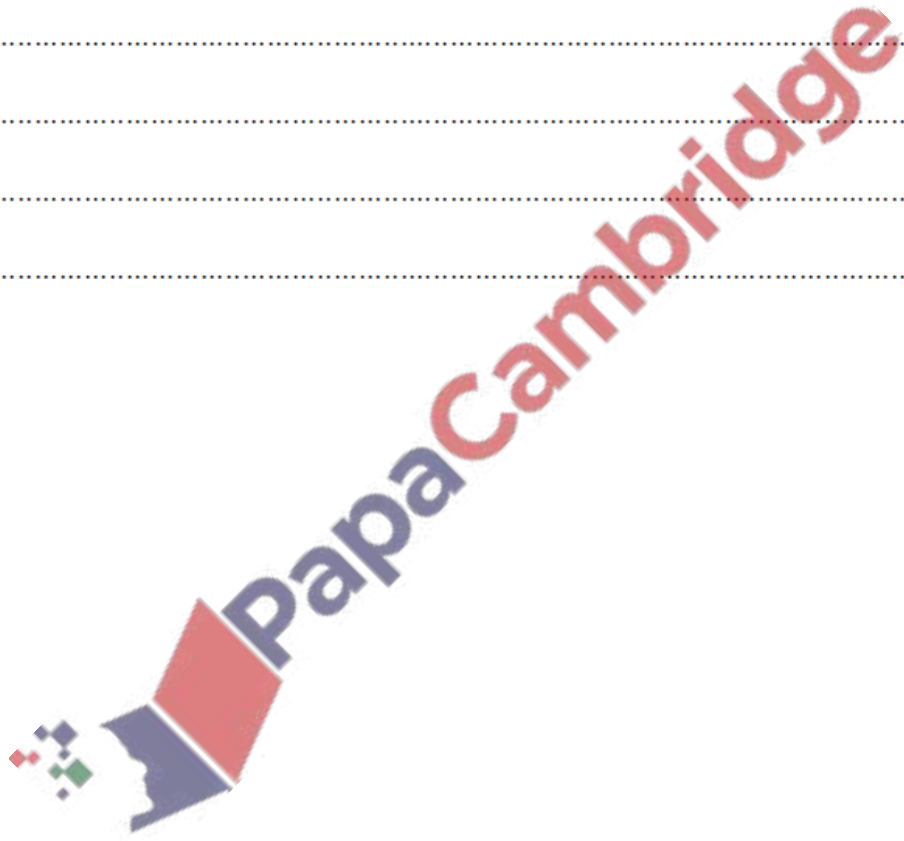
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2. March/2022/Paper_9709/22/No.5(a)

(a) Given that $y = \tan^2 x$, show that $\frac{dy}{dx} = 2 \tan x + 2 \tan^3 x$.

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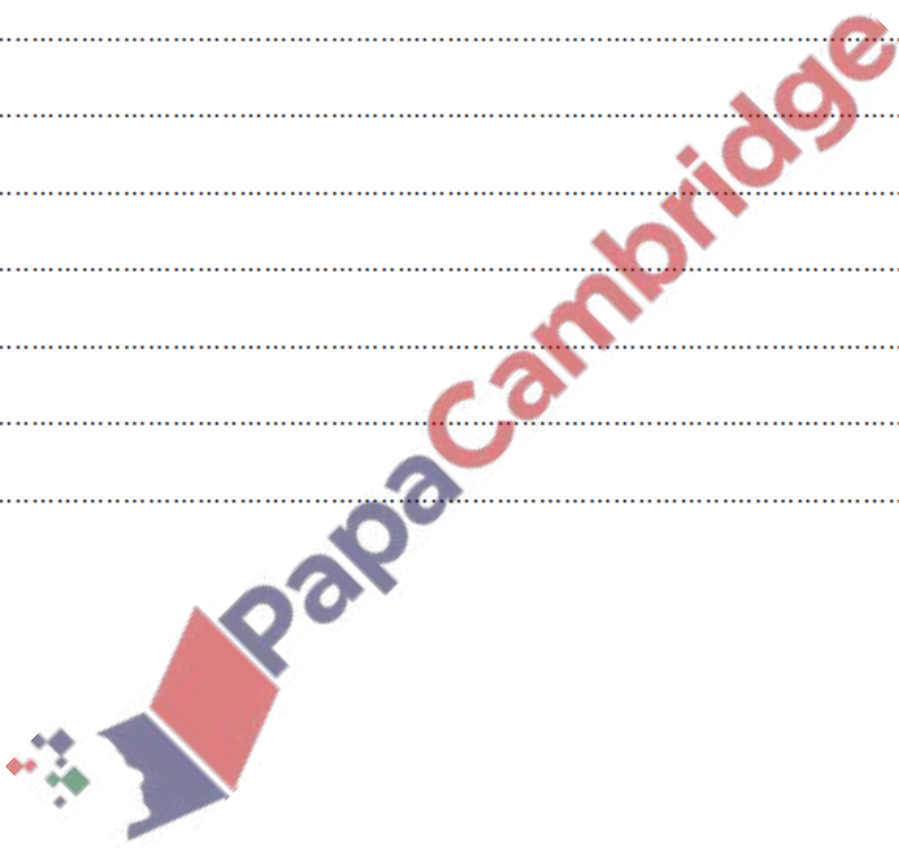
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3. March/2022/Paper_9709/22/No.7

A curve has equation $e^{2x}y - e^y = 100$.

(a) Show that $\frac{dy}{dx} = \frac{2e^{2x}y}{e^y - e^{2x}}$.

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(b) Show that the curve has no stationary points.

[2]

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It is required to find the x -coordinate of P , the point on the curve at which the tangent is parallel to the y -axis.

- (c) Show that the x -coordinate of P satisfies the equation

$$x = \ln 10 - \frac{1}{2} \ln(2x - 1). \quad [4]$$

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- (d) Use an iterative formula, based on the equation in part (c), to find the x -coordinate of P correct to 3 significant figures. Use an initial value of 2 and give the result of each iteration to 5 significant figures. [3]

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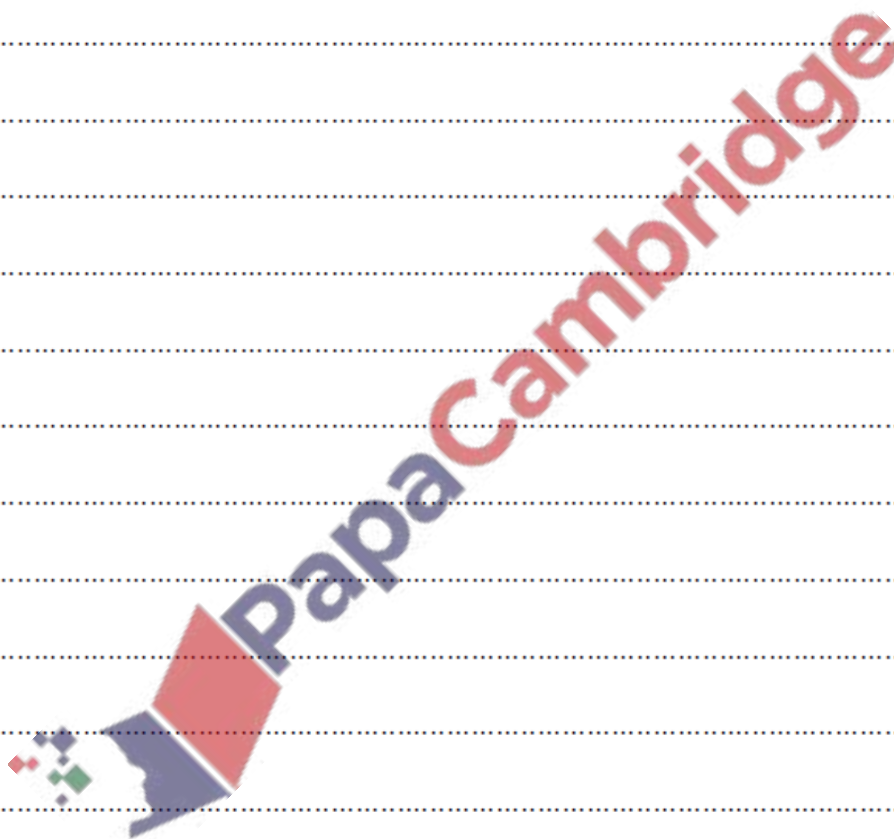
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A curve has equation $y = \frac{9e^{2x} + 16}{e^x - 1}$.

(a) Show that the x -coordinate of any stationary point on the curve satisfies the equation

$$e^x(3e^x - 8)(3e^x + 2) = 0. \quad [4]$$



Given that $y = \frac{\ln x}{x^2}$, find the exact value of $\frac{dy}{dx}$ when $x = e$.

[3]

