Differentiation – 2021 A2 Nov P3

1. Nov/2021/Paper_9709/31/No.3

The curve with equation $y = xe^{1-2x}$ has one stationary point.

(a) Find the coordinates of this point. [4]

(b) Determine whether the stationary point is a maximum or a minimum. [2]

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2. Nov/2021/Paper_9709/32/No.9

The equation of a curve is $ye^{2x} - y^2e^x = 2$.

(a) Show that $\frac{dy}{dx} = \frac{2ye^x - y^2}{2y - e^x}$. [4]

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(b) Find the exact coordinates of the point on the curve where the tangent is parallel to the y-axis. [4]

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3. Nov/2021/Paper_9709/32/No.11(a), (b)

The equation of a curve is $y = \sqrt{\tan x}$, for $0 \leqslant x < \frac{1}{2}\pi$.

(a) Express $\frac{dy}{dx}$ in terms of $\tan x$, and verify that $\frac{dy}{dx} = 1$ when $x = \frac{1}{4}\pi$. [4]

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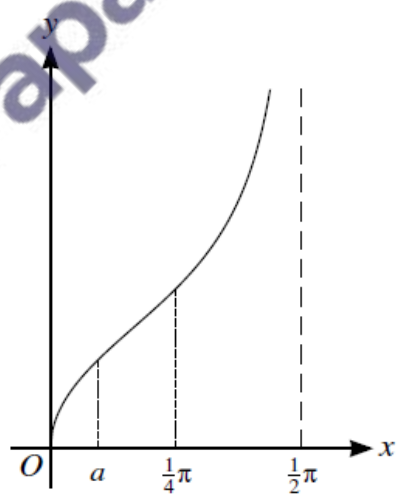
The value of $\frac{dy}{dx}$ is also 1 at another point on the curve where $x = a$, as shown in the diagram.



(b) Show that $t^3 + t^2 + 3t - 1 = 0$, where $t = \tan a$. [4]

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4. Nov/2021/Paper_9709/33/No.7

The equation of a curve is $\ln(x+y) = x - 2y$.

(a) Show that $\dfrac{dy}{dx} = \dfrac{x+y-1}{2(x+y)+1}$. [4]

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(b) Find the coordinates of the point on the curve where the tangent is parallel to the x-axis. [3]

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