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A LEVEL MATHS

(51) Differentiating other Trigonometric Functions

WORKING AT D/E

(1) Use the formula book to differentiate each of the following:

(a) $\tan x$ (b) $\sec x$ (c) $\cot x$
(d) $\operatorname{cosec} x$ (e) $\tan 2x$ (f) $-\sec 4x$

(2) Given that $y = \sec^2 x$ use the chain rule to show that $\frac{dy}{dx} = \sec^2 x \tan x$

(3) Use either the product or quotient rule to differentiate each of the following:

(a) $x \tan x$ (b) $\frac{\tan x}{e^x}$ (c) $e^{3x} \operatorname{cosec} x$

(d) $\frac{\cot 4x}{3x}$

WORKING AT B/C

(1) By writing $\tan x$ in terms of $\sin x$ and $\cos x$, use the quotient rule to show that $\frac{d}{dx} \tan x = \sec^2 x$

(2) (a) Show that $\frac{3}{\sin x \cos x} \equiv 6 \operatorname{cosec} 2x$

(b) Hence, find the derivative of $\frac{3}{\sin x \cos x}$

(3) $y = e^{\mathrm{si}}$, $x \epsilon R$

(a) Find $\frac{dy}{dx}$

(b) Hence, show that the tangent to the curve where $x = 0$ is $y = x + 1$

WORKING AT A*/A

(1) (a) By writing $\cot x$ in terms of $\sin x$ and $\cos x$, find $\frac{d}{dx} \cot x$.

(b) $y = \cot x$, $0 < x < \pi$

Find the equation of the tangent to the curve at the point where $x = \frac{\pi}{6}$ in the form $y = mx + c$

(2) (a) $x = \sin 2y$, $\frac{-\pi}{4} < y < \frac{\pi}{4}$

(b) Find $\frac{dy}{dx}$ in terms of y

(c) Find $\frac{dy}{dx}$ in terms of x

(3) (a) Show that $\frac{(\sin x + \cos x)^2}{\sin 2x} = 1 + \operatorname{cosec} 2x$

(b) Hence, find $\frac{d}{dx} \frac{(\sin x + \cos x)^2}{\sin 2x}$

(c) Given that $g(x) = \frac{(\sin x + \cos x)^2}{\sin 2x}$, $0 < x < \frac{\pi}{6}$,

show that $g(x)$ is never stationary.