Alexander Miles
5/05/2022

ACHA4006
Further Mathematics

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1 i) $y = 5x^4 + 5x^2 + 3x - 19 =$

$y = \frac{d}{dx}(5x^4 + 5x^4 + 5x^2 + 3x - 19)$

$\frac{d}{dx}(F+g) = \frac{d}{dx}(F) + \frac{d}{dx}(g)$

$y = \frac{d}{dx}(5x^4) + \frac{d}{dx}(5x^2) + \frac{d}{dx}(3x) - \frac{d}{dx}(19$

$y = 5x\,4x^3 + 5 \times 2x + 3 - 0$

$y = 20x^3 + 10x + 3$

ii) $y = (2x+5) \times (x-1)$

$y = 2x^2 - 2x + 5x - 5$

$y = 2x^2 + 3x - 5$

iii) $y = \frac{1}{x^6} - \cos(5x)$

$y = \frac{1}{x^6} - \frac{\cos(5x)}{1}$

$y = \frac{1}{x^6} - \frac{x^6 \times \cos(5x)}{x^6 \times 1}$

$y = \frac{1}{x^6} - x^6 \frac{\times \cos(5x)}{x^6}$

$y = \frac{1 - x^6 \times \cos(5x)}{x^6}$

iv) $y = e^{2x} \times \sin(3x)$

$y = \frac{d}{dx}(e^{2x} \times \sin(3x))$

$y = \frac{d}{dx}(e^{2x}) \times \sin(3x) + e^{2x} \times \frac{d}{dx}(\sin(3x))$

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iv) $y = e^{2x} \times 2\sin(3x) + e^{2x} \times \cos(3x) \times 3$
$y = 2e^{2x} \times \sin(3x) + 3e^{2x} \times \cos(3x)$

v) $y = \frac{\tan(7x)}{\sin(x)}$

$y = \frac{d}{dx}\left(\frac{\tan(7x)}{\sin(x)}\right)$

$y = \frac{\frac{d}{dx}(\tan(7x)) \times \sin(x) - \tan(7x) \times \frac{d}{dx}(\sin(x))}{\sin(x)^2}$

$y = \frac{\sec(7x)^2 \times 7\sin(x) - \tan(7x)\cos(x)}{\sin(x)^2}$

$y = \frac{7\sin(x) - \cos(7x)\sin(7x)\cos(x)}{\cos(7x)^2 \sin(x)^2}$

vi) $y = \sqrt{6x^2 - 3x + 5}$

$y = \frac{d}{dx}\left(\sqrt{6x^2 - 3x + 5}\right)$

$y = \frac{d}{dg}(\sqrt{g}) \times \frac{d}{dx}(6x^2 - 3x + 5)$

$y = \frac{1}{2\sqrt{g}} \times (6 \times 2x - 3)$

$y = \frac{1}{2\sqrt{6x^2 - 3x + 5}} \times (6 \times 2x - 3)$

$y = \frac{12x - 3}{2\sqrt{6x^2 - 3x + 5}}$

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Q2

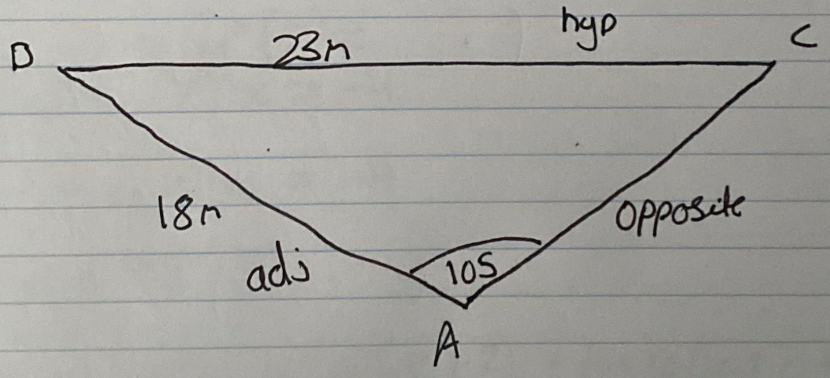
i [redacted]

$\sin x = 0.43$
$x = \sin^{-1}$
$x = 25.46°$
$180 - 25.46 = 154.54$

ii) $5 \tan x = -7$
$x = \frac{\tan^{-1}(-7)}{5}$
$x = 16.37$
$180° - 16.37° = 163.33$

iii) $5 \cos x = 3$
$x = \frac{\cos(3)}{5}$
$x = 145.08 = 34.42°$

Q3



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Q4 $y = \frac{t(x^2+R)}{\theta}$

$y = \frac{t \times (x^2+R}{\theta}$

$y = \frac{tx^2 + tR}{\theta}$

$\theta y = tx^2 + tR$

$-tx^2 = tR - \theta y$

$x^2 = \frac{-tR - \theta y}{t}$

$x^2 = \frac{\theta y - tR}{t}$

$x = \sqrt{\frac{\theta y t - t^2 R}{t}}$

$x = -\sqrt{\frac{\theta y t - t^2 R}{t}}$

Q5i) $3^{x+4} = 7^x$

$x + 4 = \log^3(7)x$

$x - \log_3(7)x = -4$

$(1 - \log 3(7))x = -4$

$x = 5.186$

ii) $\log 10(x+5) + \log_{10}(x+2) = \log 10(x+7) + \log 10(x+6)$

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Q6i) $\int x^8 + 4x^3 + 5x - 1 \, dx$

$\int x^8 \, dx + \int 4x^3 \, dx + \int 5x \, dx - \int 1 \, dx$

$\frac{x^9}{9} + x^4 + \frac{5x^2}{2} - x$

ii)

iii) $5 \sin(3x) \, dx$

$5 \times \sin(3x) \, dx$

$5 \times \sin$