

JAY DOBBING
2106370

FURTHER MATHEMATICS
(ACHA 4006)

5/5/2022

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Q1.

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

$$\frac{dy}{dx} = \underline{20x^3 + 10x + 3}$$

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

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

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

$$\frac{dy}{dx} = \underline{4x + 3}$$

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

$$\frac{dy}{dx} = \underline{x^{-6} - 5\sin 5x}$$

(iiii) $y = \underset{u}{e^{2x}} \underset{v}{\sin 3x}$

$$\frac{du}{dx} = 2e^{2x}$$

$$\frac{dv}{dx} = 3\cos 3x$$

$$\frac{dy}{dx} = (\sin 3x)(2e^{2x}) + (e^{2x})(3\cos 3x)$$

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

$$\frac{du}{dx} = 7\sec^2 7x$$

$$\frac{dv}{dx} = \cos x$$

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

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Q1.

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

$$y = (6x^2 - 3x + 5)^{0.5}$$

$$0.5(6x^2 - 3x + 5)^{-0.5}$$

$$\frac{dy}{dx} = 0.5(6x^2 - 3x + 5)^{-0.5} (12x - 3)$$

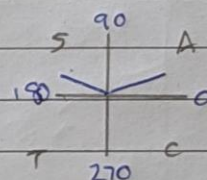
Q2.

$$(i) \sin x = 0.43$$

$$\sin^{-1} = 25.47^\circ$$

$$x = 25.47^\circ$$

$$x = 154.53^\circ$$

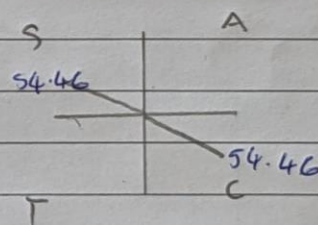


$$(ii) 5 \tan x = -7$$

$$\tan^{-1}\left(\frac{-7}{5}\right) = -54.46$$

$$x = 305.54^\circ$$

$$x = 125.54^\circ$$

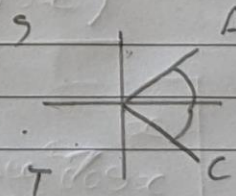


$$(iii) 5 \cos x = 3$$

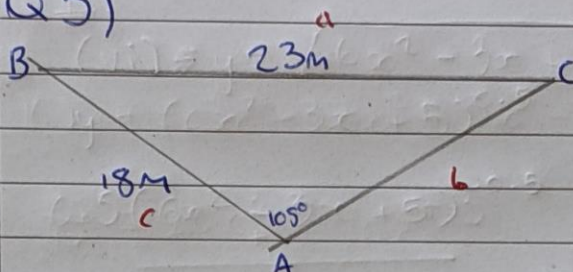
$$\cos^{-1}\left(\frac{3}{5}\right) = 53.13^\circ$$

$$x = 53.13^\circ$$

$$x = 306.87^\circ$$



Q3)



$$(i) \frac{23}{0.97} = \frac{b}{\sin B} = \frac{18}{\sin C}$$

$$\frac{23}{0.97} = \frac{18}{C}$$

$$23C = 18 \times 0.97$$

$$\sin^{-1}(0.76)$$

$$\sin C = 0.76 \quad C = 49.11$$

$$(ii) \sin B =$$

Q4.

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

$$\partial y = t(x^2 + R)$$

$$\frac{\partial y}{t} = x^2 + R$$

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

~~$$\frac{\partial y}{t} - R = x^2$$~~

$$\sqrt{\frac{\partial y}{t} - R} = x$$

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Q5

Q6)

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

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

(ii) $\int 5x^2 (x^3 + 2x + 1) \, dx$

$$= \frac{5x^3}{3} \left(\frac{x^4}{4} + \frac{2x^2}{2} + x \right)$$

$$= \frac{5x^3}{3} \left(\frac{x^4}{4} + x^2 + x \right) + C$$

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

$$5 \int \sin 3x \, dx$$

$$5x = \frac{-1}{3} \cos 3x$$

$$= -\frac{5}{3} \cos 3x + C$$

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Q6)

(iv)

$$\int_0^5 (x+5)(x+1) dx$$

$$\int_0^5 x^2 + x + 5x + 5$$

$$\int_0^5 x^2 + 6x + 5 dx$$

$$\left[\frac{x^3}{3} + \frac{6x^2}{2} \right]_0^5$$

$$\left[\frac{(5)^3}{3} + \frac{6(5)^2}{2} \right]$$

$$\left[\frac{125}{3} + \frac{150}{2} \right]$$

$$[41.67 + 75]$$

$$= \underline{491.67}$$