

Q1

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

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

ii) $y = (2x+5)(x-1)$
 $y = 2x^2 + 3x - 5$

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

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

$$y = x^{-6} + 5\sin 5x$$

$$\frac{dy}{dx} = -6x^{-7} + 5\sin 5x$$

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

$$v \frac{du}{dx} + u \frac{dv}{dx}$$

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

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

$$v \frac{du}{dx} - u \frac{dv}{dx}$$

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

Q1

v1) $y = \sqrt{6x^2 - 3x + 5}$

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

$\frac{dy}{dx} = \frac{1}{2} (6x^2 - 3x + 5)^{-\frac{1}{2}} (12x - 3)$

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

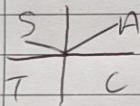
Q2) $\sin x = 0.43$

i) $\sin^{-1}(0.43)$

$x = 25.47^\circ$

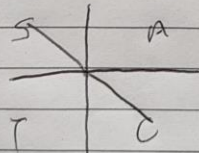
$x = 154.53^\circ$

$180 - 25.47$



ii) $5 \tan x = -7$

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



$180 - 54.46^\circ = 125.54^\circ$

$360 - 54.46^\circ = 305.54^\circ$

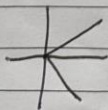
$x = 125.54^\circ$ $x = 305.54^\circ$

iii) $5 \cos x = 3$

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

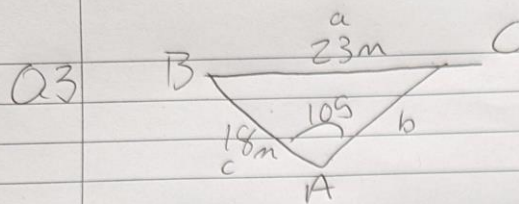
$x = 53.13^\circ$

$360 - 53.13$



$x = 306.87^\circ$

$x = 53.13^\circ$



i) Angle C

$$\frac{23}{\sin(105)} = \frac{AB}{\sin B} = \frac{18}{\sin C}$$

$$\frac{18}{\sin C} = \frac{23}{\sin(105)}$$

$$18 \sin(105) = 23 \sin C$$

$$\frac{18 \sin 105}{23} = \sin C$$

$$0.78$$

$$\sin^{-1}(0.78)$$

$$\text{Angle C} = 51.26^\circ$$

ii) Angle B = 23.74°

$$51.26 + 105 = 156.26$$

$$\frac{180}{156.26}$$

iii) length AC

$$\frac{AB}{\sin(23.74)} = \frac{23}{\sin(105)}$$

$$\frac{23 \sin(23.74)}{\sin 105}$$

$$9.57m \quad \text{length AB}$$

Q4 $y = \frac{6(x^2 + R)}{9}$

$90 = 6(6^2 + R)$

$\frac{90}{6} = (x^2 + R)$

$\frac{90 - R}{1} = x$

Q5
i) $3^{x+4} = 7^x$

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

$(x+4)0.48 = 0.85x$

$0.48x + 1.92 = 0.85x$

$\begin{array}{r} 0.85 \\ -0.48 \\ \hline \end{array}$

$\frac{1.92}{0.37} = 0.37x$

$x = 5.19$

Q5ii) $\log(x+5) + \log(x+2) = \log(x+7) + \log(x+6)$

$(x+5)(x+2) = (x+7)(x+6)$

$x^2 + 2x + 5x + 10 = x^2 + 6x + 7x + 42$

$x^2 + 7x + 10 = x^2 + 13x + 42$

$\begin{array}{r} -32 \\ 6 \end{array} = \begin{array}{r} -7x \\ 6x \end{array}$

$-9.33 = x$

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

$$5x^5 + 10x^3 + 5x^2 \, dx$$

$$\frac{5x^6}{6} + \frac{10x^4}{4} + \frac{5x^3}{3} + C$$

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

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

iv) $\int_0^9 (x+5)(x+1) \, dx$

$$\begin{array}{l} x^2 + 5x + x + 5 \\ x^2 + 6x + 5 \end{array} \quad \frac{x^3}{3} + \frac{6x^2}{2} + 5x$$

$$\left[\frac{(5)^3}{3} + \frac{6(5)^2}{2} + 5(5) \right] - \left[\frac{(0)^3}{3} + \frac{6(0)^2}{2} + 5(0) \right]$$

$$41.67 + 75 + 25 - 0$$

$$141.67$$