

Q1) i) $y = 7x^3 - 2x^2 + x + 2$
 $\left| \frac{dy}{dx} = 21x^2 - 4x + 1 \right|$

ii) $y = (x+3)(x+2)$
 $\Rightarrow y = x^2 + 2x + 3x + 6$
 $\Rightarrow y = x^2 + 5x + 6$
 $\left| \frac{dy}{dx} = 2x + 5 \right|$

iii) $y = \frac{1}{x^4} + \sin(3x)$
 $\left| \frac{dy}{dx} = -\frac{4}{x^5} + 3\cos(3x) \right|$

iv) $y = \underbrace{x^4}_u \underbrace{\tan 2x}_v$

$u = x^4 \quad v = \tan 2x$
 $\frac{du}{dx} = 4x^3 \quad \frac{dv}{dx} = 2\sec^2(2x)$

$\left| \frac{dy}{dx} = (\tan 2x)(4x^3) + (x^4)(2\sec^2(2x)) \right|$

v) $y = \frac{e^{2x}}{\cos 2x}$
 $\leftarrow u \quad \leftarrow v$

$\left| \frac{dy}{dx} = \frac{(\cos 2x)(2e^{2x}) - (e^{2x})(-2\sin(2x))}{(\cos 2x)^2} \right|$

vi) $y = (5x^2 + 2x + 1)^5$

~~$$\frac{dy}{dx} = 5(5x^2 + 2x + 1)^4 (10x + 2)$$~~

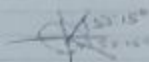
$$\boxed{\frac{dy}{dx} = 5(5x^2 + 2x + 1)(10x + 2)}$$

Q2) i) $\sin x = 0.65$
 $x = \sin^{-1}(0.65)$
 $x = 40.54^\circ$



$$x = 180 - 40.54 = 139.46^\circ$$

ii) $7 \cos x = 4$
 $\cos x = \frac{4}{7}$
 $x = \cos^{-1}\left(\frac{4}{7}\right)$
 $x = 55.15^\circ$



$$x = 360 - 55.15 = 304.85^\circ$$

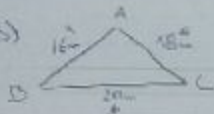
iii) $\tan x = -0.22$
 $x = \tan^{-1}(0.22)$
 $x = 12.41^\circ$



$$x = 180^\circ - 12.41^\circ = 167.59^\circ$$

$$x = 360^\circ - 12.41^\circ = 347.59^\circ$$

Q3)



$$16^2 = 20^2 + 18^2 - 2(20)(18)\cos A$$

$$\Leftrightarrow 256 = 400 + 324 - 720\cos A$$

$$\Leftrightarrow 256 - 724 = -720\cos A$$

$$\Leftrightarrow -468 = -720\cos A$$

$$\Leftrightarrow \cos A = \frac{468}{720}$$

$$\Leftrightarrow A = \cos^{-1}\left(\frac{468}{720}\right)$$

$$\Leftrightarrow \boxed{A = 50.79^\circ}$$

$$Q4) P = \sqrt{\frac{xy}{T}} + 3$$

$$\Leftrightarrow (P-3)^2 = \frac{xy}{T}$$

$$\Leftrightarrow \boxed{\frac{T(P-3)^2}{y} = x}$$

$$Q5) i) 5^{x+2} = 2^x$$

$$\log(5^{x+2}) = \log(2^x)$$

$$(x+2)\log 5 = x\log 2$$

$$x\log 5 + 2\log 5 = x\log 2$$

$$0.40x + 1.40 = 0.30x$$

$$0.40x = -1.40$$

$$x = -\frac{1.40}{0.4}$$

$$\boxed{x = -3.5}$$

$$ii) \log(x+2) + \log(x+3) = 2\log(x+1)$$

$$\log(x+2)(x+3) = \log(x+1)^2$$

$$x^2 + 5x + 6 = x^2 + 2x + 1$$

$$3x = -5$$

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

$$\boxed{x = 1.67}$$

$$\begin{aligned} \text{Q6) i)} \quad & \int x^4 + 3x^2 - 3x + 1 \, dx \\ & = \frac{x^5}{5} + \frac{3x^3}{3} - \frac{3x^2}{2} + x + C \end{aligned}$$

$$\text{ii)} \quad \int (x-1)(x-3) \, dx$$

$$\int x^2 - 4x + 3 \, dx$$

$$\int x^2 - 4x + 3 \, dx$$

$$= \frac{x^3}{3} - \frac{4x^2}{2} + 3x + C$$

$$\text{iii)} \quad \int 3 \sec^2 2x \, dx$$

$$= 3 \left(\frac{1}{2} \tan(2x) \right) + C$$

$$= \frac{3}{2} \tan(2x) + C$$

$$\text{iv)} \quad \int_0^4 (x+3)(x+2) \, dx$$

$$\int_0^4 x^2 + 2x + 3x + 6 \, dx$$

$$= \left[\frac{x^3}{3} + \frac{5x^2}{2} + 6x \right]_0^4$$

$$= \left[\frac{4^3}{3} + \frac{5(4^2)}{2} + 6(4) \right] - [0]$$

$$= \left[\frac{64}{3} + 40 + 24 \right] - [0]$$

$$= 245.33$$

$$v) \int_2^3 x(x+1) + e^x dx$$

$$\int_2^3 x^2 + x + e^x dx$$

$$= \left[\frac{x^3}{3} + \frac{x^2}{2} + e^x + C \right]_2^3$$

$$= \left[\frac{3^3}{3} + \frac{3^2}{2} + e^3 + C \right] - \left[\frac{2^3}{3} + \frac{2^2}{2} + e^2 + C \right]$$

$$= [9 + 4.5 + e^3 + C] - [2.67 + 2 + e^2 + C]$$

$$= \boxed{8.83 + (e^3 - e^2)}$$