

(i)  $y = 7x^3 - 2x^2 + x + 2$

$$\frac{dy}{dx} = 21x^2 - 4x + 1$$

(ii)  $y = (x+3)(x+2)$

$$y = x^2 + 2x + 3x + 6$$

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

$$\frac{dy}{dx} = 2x + 5$$

(iii)  $y = \frac{1}{x^3} + \sin 3x$

$$y = x^{-3} + \sin 3x$$

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

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

(iv)  $y = \frac{x^4}{u} \tan 2x$

$$\frac{du}{dx} = 4x^3 \quad \frac{dy}{dx} = \tan 2x (4x^3) + x^4 (2\sec^2 2x)$$

$$\frac{dv}{dx} = 2\sec^2 2x$$

(v)  $y = \frac{e^{2x}}{\cos 2x}$

$$\frac{du}{dx} = 2e^{2x} \quad \frac{dy}{dx} = \frac{\cos 2x (2e^{2x}) - e^{2x} (-2\sin 2x)}{\cos^2 2x}$$

$$\frac{dv}{dx} = -2\sin 2x$$

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

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

$$\frac{dy}{dx} = (50x + 10) (5x^2 + 2x + 1)^4$$

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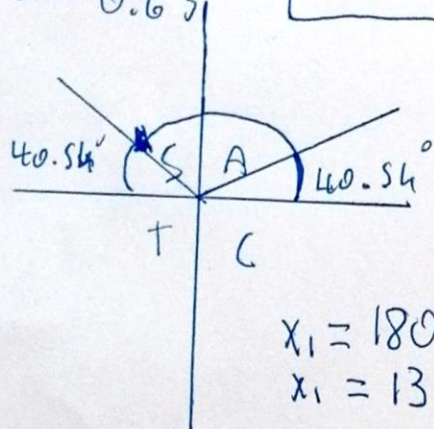
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(Q2)

(i)  $\sin x = 0.65$

$$x = \sin^{-1} 0.65$$

$$x = 40.54^\circ$$



$$x_1 = 180 - 40.54$$

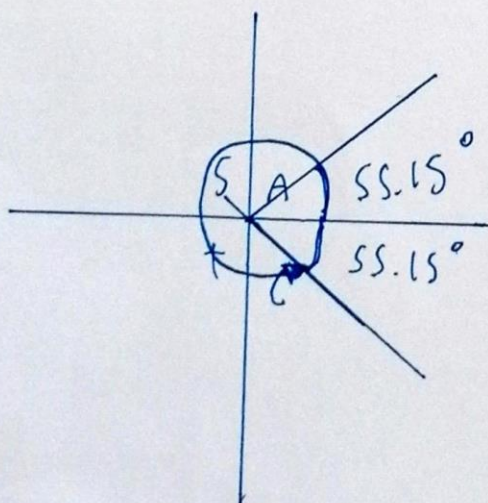
$$x_1 = 139.46^\circ$$

(ii)  $7 \cos x = 4$

$$\cos x = \frac{4}{7}$$

$$x = \cos^{-1} 0.57$$

$$x = 55.15^\circ$$



$$x_1 = 180 - 55.15$$

$$x_1 = 124.85^\circ$$

$$x_2 = 360 - 55.15$$

$$x_2 = 304.85^\circ$$

(2)

(iii)  $\tan x = -0.22$

$x = \tan^{-1} 0.22$

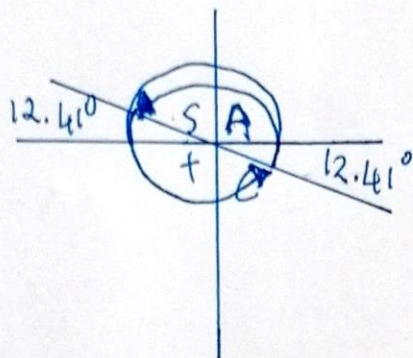
$x = 12.41^\circ$  not a solution

$x_1 = 360 - 12.41$

$x_1 = 347.59^\circ$

$x_2 = 180 - 12.41$

$x_2 = 167.59^\circ$



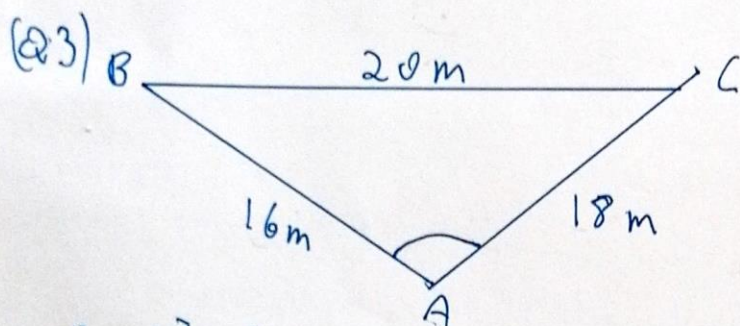
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$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

$$400 = 256 + 324 - 576 \cos A$$

$$576 \cos A = 256 + 324 - 400$$

$$\cos A = \frac{256 + 324 - 400}{576}$$

$$\cos A = 0.31$$

$$A = \cos^{-1} 0.31$$

$$A = 71.79^\circ$$

(Q4)

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

$$P - 3 = \sqrt{\frac{xy}{T}}$$

we raise in power 2 both sides of the equation

$$(P - 3)^2 = \left(\sqrt{\frac{xy}{T}}\right)^2$$

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

$$T(P - 3)^2 = xy$$

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

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(Q5)

$$(1) 5^{x+2} = 2^x$$

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

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

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

$$x\log 5 - x\log 2 = -2\log 5$$

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

$$x = \frac{-2\log 5}{(\log 5 - \log 2)}$$

$$x = \frac{-1.40}{0.40}$$

$$x = -3.51$$

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

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

$$x^2 + 3x + 2x + 6 = (x+1)(x+1)$$

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

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

$$5x - 2x = 1 - 6$$

$$3x = -5$$

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

$$x = -1.67$$

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(Q6)

$$(i) \int x^4 + 3x^2 - 3x + 1 dx =$$

$$= \frac{x^5}{5} + \frac{3x^3}{3} - \frac{3x^2}{2} + 1x + C$$

$$= \frac{x^5}{5} + x^3 - \frac{3x^2}{2} + 1x + C$$

$$(ii) \int (x-1)(x-3) dx =$$

$$\int x^2 - 3x - x - 3 dx =$$

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

$$(iii) \int 3 \sec^2 2x dx$$

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

$$(IV) \int_0^4 (x+3)(x+2) dx$$

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

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

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

$$= \frac{64}{3} + \frac{80}{2} + 24$$

$$= 21.33 + 40 + 24$$

$$= 85.33$$

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

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

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

$$= \frac{3^3}{3} + \frac{3^2}{2} + e^3 - \left( \frac{2^3}{3} + \frac{2^2}{2} + e^2 \right)$$

$$= \frac{27}{3} + \frac{9}{2} + 20.09 - \left( \frac{8}{3} + \frac{4}{2} + 7.39 \right)$$

$$= \frac{27}{3} + \frac{9}{2} + 20.09 - \frac{8}{3} - \frac{4}{2} - 7.39$$

$$= \frac{19}{3} + \frac{5}{2} + 12.7$$

$$= 21.53$$

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