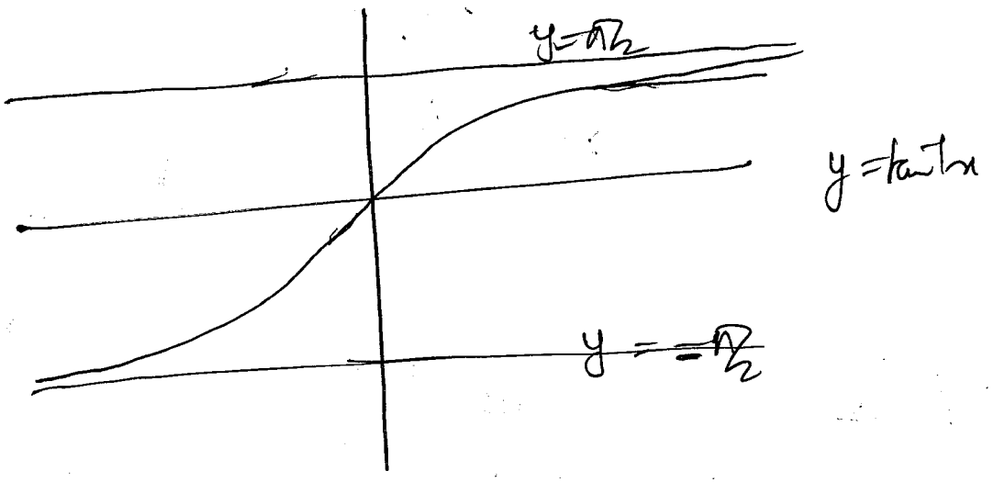
CSSC Mathematics Set 3 (MS) (11)

(24) $\int \frac{2\cos x - 3\sin x}{6\cos x + 4\sin x}\,dx$

$\frac{1}{2}\log|3\cos x + 4\sin x| + c$ (2)

(21) $+\pi/6 - \pi/3 - \pi/4 = -\pi/6 - \pi/4 = -\frac{5\pi}{12}$;



SECTION C

31) $\frac{dx}{d\theta} = a\left[e^{\theta}(\sin\theta - \cos\theta)\right] + e^{\theta}(\cos\theta + \sin\theta)$ (1)

$= 2ae^{\theta}\sin\theta$

$\frac{dy}{d\theta} = a\left[e^{\theta}(\sin\theta + \cos\theta) + e^{\theta}(\cos\theta - \sin\theta)\right]$ (1)

$= 2ae^{\theta}\cos\theta$

$\frac{dy}{dx} = \frac{dy}{d\theta} \cdot \frac{d\theta}{dx} = \cot\theta \cdot \left(\frac{dy}{dx}\right)_{\theta=\pi/4} = 1.$ (½)

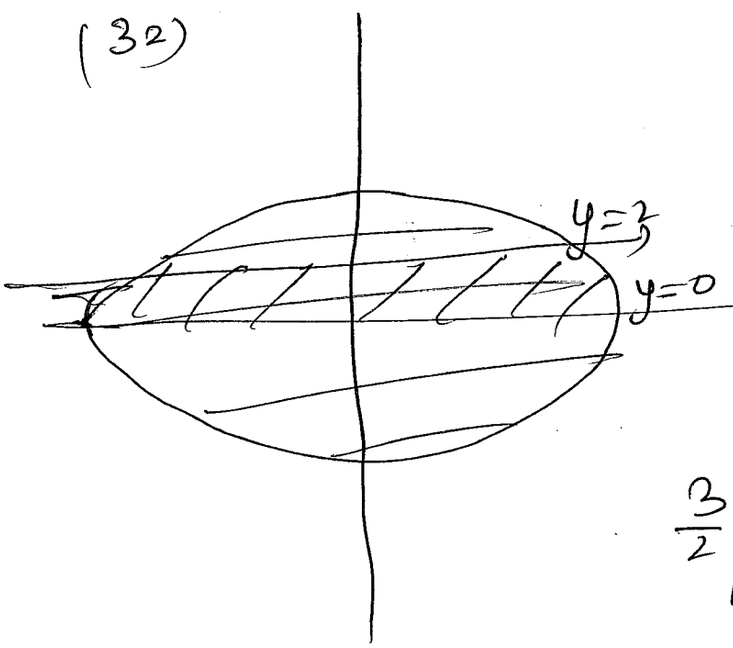
(½)

SECTION D

(32)

SECTION-D

(32)



$$A = 2\int_0^4 \sqrt{16-x^2}\,dx \quad (2)$$

$$\frac{3}{2}\left[\frac{x}{2}\sqrt{16-x^2} + 8\sin^{-1}\frac{x}{4}\right]_0^4 \quad (2)$$

$$= 3\left[4\pi\right] = 12\pi$$

$$\frac{3}{2}\left[\sqrt{12} + \frac{8\pi}{3} - 0\right]$$

(34) Pt of $\Pi'' = (2+\lambda, 2\lambda, -3+3\lambda) = (2+2\mu, -1+3\mu, -4+\mu)$ (2)

$\lambda = 1$, $\mu = 1$ (1) Verify in III Coordinate (1)

Pt of $\Pi'' = (3, 2, 0)$ (1)

OR

P (2, 4, −1)

F (−5 + λ, −3 + 4λ, 7 − 9λ) = Foot of ⊥ (1)

dr's of PF = ⟨−7 + λ, −7 + 4λ, 8 − 9λ⟩ (1)

dr's of L = ⟨1, 4, −9⟩

$98\lambda = +98$

$\lambda = \frac{+98}{98} = 1$ (1)

F = (−4, 1, −2) (1)

$D = \sqrt{36+9+4} = 7$ (1)

(24) $\int \frac{\cos^9 x\,dx}{\sin x}\,dx$ $\left.\begin{matrix}\sin x = t \\ \cos x\,dx = dt\end{matrix}\right\}$ ½

$I = \int \frac{(1-t^2)^4}{t}\,dt$

$= \int \left(\frac{1}{t} - 4t + 6t^3 - 4t^5 + t^7\right) dt$ (½)

$= \log|\sin x| - 2\sin^2 x + \frac{3}{2}\sin^4 x - \frac{2}{3}\sin^6 x + \frac{1}{8}\sin^8 x + c$ (1)

(25) $f(x) = 6 + 12x + 3x^2 - 2x^3$

$f'(x) = -6x^2 + 6x + 12 = 0$ (½)

$\Rightarrow x = 2, -1$ $\left(\frac{1}{2}\right)$

$f(x)$ is inc in $[-1, 2]$ & dec. in $(-\infty, -1) \cup (2, \infty)$ } (1)

SECTION-C

26) $\int e^{\log x} + \sin x)\cos x\,dx$

$= \int (x\cos x + \sin x \cos x)\,dx$ (½)

$= x\sin x - \int \sin x\,dx + \frac{1}{2}\int \sin 2x\,dx$ (2)

$= x\sin x + \log x - \frac{\cos 2x}{4} + c$ $\left(\frac{1}{2}\right)$

26 (OR) $\int \frac{2x+9}{(x+2)(x-3)^2}\,dx$

Partial Fraction

$\int \left[\frac{A}{x+2} + \frac{B}{x-3} + \frac{C}{(x-3)^2}\right] dx$ (1)

$A = 1/5 \quad B = -1/5 \quad C = 3$ (1)

$I = \frac{1}{5}\log|x+2| - \frac{1}{5}\log|x-3| - \frac{3}{x-3} + c$ (1)