

PAPER I

1. (a) Verify that $x = 2$ "works" in the equation
 (b) OTHER roots are $-3, \frac{1}{2}$

2. (a) $3x - 4y = -5$ (b) $4x + 3y = 10$

3. (a) $[24 + 9] = 33 \text{ units}^2$ (b) $\int_2^5 (2x+4) dx$ (c) 33 units^2

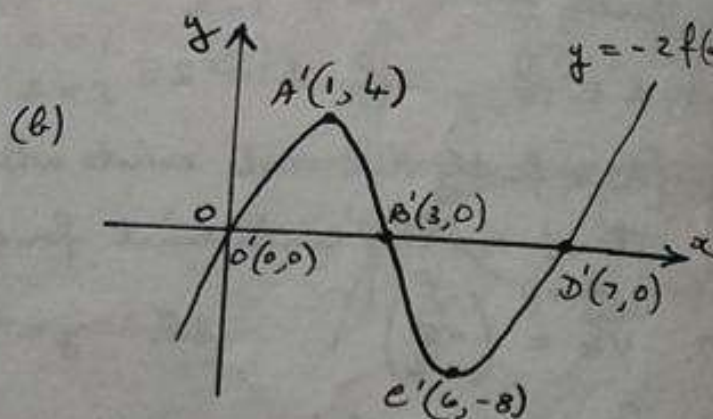
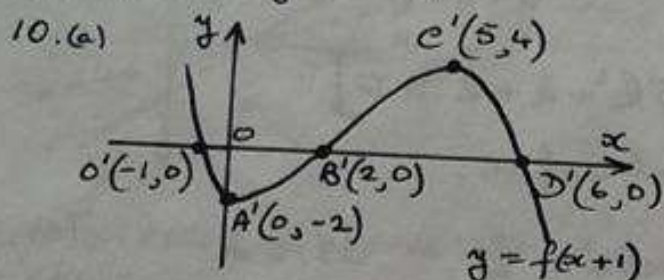
4. $(x+3)^2 + (y-4)^2 = 25$

5. $f'(-1) = 24.$

6. $\vec{cV} = \begin{pmatrix} -5 \\ -5 \\ 7 \end{pmatrix} \begin{pmatrix} -5 \\ -5 \\ 7 \end{pmatrix}$ 7. $\frac{1}{\sqrt{3}}$

8. (a) $b^2 - 4ac = 0$ (b) rearrange into $x^2 + 6x + 9 = 0$ and then verify that $\Delta = 0.$

9. $10x + y = -3$



11. $y = \frac{1}{4}x^4 - \frac{1}{x} - \frac{1}{4}x + 3$

12. $[\cos x = \frac{2}{\sqrt{11}}] \therefore \cos 2x = -\frac{3}{11}$

13. (a) $f(x) = 2(x-1)^2 + 3$ (b) S.P. at $(1, 3)$ and it is a MINIMUM

14. $A(13.93^\circ, \frac{2}{3}a)$ $B(46.07^\circ, \frac{2}{3}a)$

15. $a = -2$ $b = 5$

16. $[\frac{dy}{dx} = 6x^2 + 6x + 4]$ and then verify that $\Delta = -60$ $\therefore \Delta < 0$
 and GIVE A CLEAR CONCLUSION.

17. (a) (i) 9 (ii) 8 (iii) 6 (b) $k_1 \cdot k_2 = 68$; $|k_1| = 2\sqrt{17}$

18. $k = 2g$

19. $f'(x) = -2 \sin 2x$ 20. $\frac{2}{3}x^{\frac{3}{2}} + \frac{10}{x^{\frac{1}{2}}} + C$

21. (a) $f(2x) = 1 + 2x + 2x^2 + \frac{4}{3}x^3 + \frac{2}{3}x^4 + \frac{4}{15}x^5 + \dots$

(b) $[f'(2x) = 2 + 4x + 4x^2 + \frac{4}{3}x^3 + \frac{4}{3}x^4 + \dots]$

$\therefore f'(2x) = 2f(2x)$

PER II

1. (a) $3x + y = 14$ (b) $x + 2y = -2$ (c) $(6, -4)$

2. (a) $2x + y = -3$ (b) $B(0, -3)$ (c) $C(-2, 1)$ (d) $(x+1)^2 + (y+1)^2 = 5$

3. (a) $\vec{AK} = \begin{pmatrix} -5 \\ 5 \\ 11 \end{pmatrix}$ (b) $\vec{AL} = \begin{pmatrix} 2 \\ 4 \\ 9 \end{pmatrix}$ (c) $\hat{KAL} = 33.96^\circ (34^\circ)$

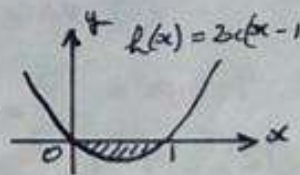
4. (a) $P(4, 0)$ (b) $x + 2y = 4$ (c) $Q(\frac{1}{2}, \frac{7}{4})$

5. (a) (i) $8x + 9y$ (ii) $[A = 6xy \text{ and } y = \frac{360 - 8x}{9}]$ Hence required result.

(b) [Verify firstly that $x = 22\frac{1}{2}$ gives a MAX. S.A. Table of values required]

$x = 22\frac{1}{2} \text{ m}$ $y = 20 \text{ m}$ MAX. AREA = 2700 m^2

6. (a) (i) $x^2 - 1$ (ii) $x^2 - 2x + 1$ (b) "PROOF" : GRAPH \rightarrow



(c) [INTEGRAL = $-\frac{1}{3}$] \therefore Area = $\frac{1}{3} \text{ unit}^2$.

7. (a) $k = 0.07192$ (b) 51.3%

8. (a) [DRAW A PERPENDICULAR FROM P TO x-axis AND USE THAT RIGHT-ANGLED TRIANGLE]

(b) $Q(\cos(a-45^\circ), \sin(a-45^\circ))$ (c) $R(\cos(a+45^\circ), \sin(a+45^\circ))$

(d) $m_{QR} = -\frac{\cos a}{\sin a}$ (e) Prove also that $m_{TGT \text{ AT } P} = -\frac{\cos a}{\sin a}$ and then give a clear conclusion.

9. [FIRST VERIFYS THAT $2\sin x - 3\cos x = \sqrt{13} \cos(x - 146.3^\circ)$]

$x = 100.2^\circ, 192.4^\circ$

10. (a) $k = 1$ $z = 2$

(b) $[1\frac{5}{12} + 1\frac{1}{12}] = 2\frac{1}{2} \text{ units}^2$.

11. (a) AT P: $y = 3x + 20$ AT Q: $y = 3x - 12$

(b) [DRAW PERP. FROM Q TO OTHER TGT. CALL THIS, SAY QR
OBTAIN: QR: $x + 3y = -16$
 $R(-7\frac{3}{5}, -2\frac{4}{5})$
 $QR^2 = \frac{2560}{25}$]

Required result then follows.