Nishant Jindal

2.

$$\sin^2 x(\sin x+\cos x) = 3\sin x\cos x(\cos x-\sin x)+3\cos x.$$

$$= 3\cos x\left(\sin x\cos x-\underline{\sin^2 x+1}\right)$$

$$\sin^2 x(\sin x+\cos x) = 3\cos^2 x\left(\sin x+\cos x\right)$$

$$\sin x+\cos x=0 \quad \text{or} \quad \tan^2 x=3.$$

$$\cos 3x-\sin 3x = \cos 2x$$

$$4(\cos^3 x+\sin^3 x)-3(\cos x+\sin x) = \cos^2 x-\sin^2 x.$$

$$\cos x+\sin x=0 \quad \text{or} \quad 4(1-\sin x\cos x)-3 = \cos x-\sin x$$

Nishant Jindal

$$2\left(\underline{\cos 4\theta}+\cos 2\theta\right)\cos 2\theta = 1$$

$$\underline{4t^3+2t^2}-2t-1=0$$

$$\left(2t^2-1\right)\left(2t+1\right)=0$$

$$\sin 11x + \sin\left(3x+\frac{\pi}{6}\right) = 0$$

$$3x+\frac{\pi}{6} = n\pi+(-1)^n\left(-11x\right)$$

$$n \in I$$

Nishant Jindal

$$\sqrt{3}(\cos x+\sin x)-(\cos x-\sin x)=\sqrt{2}.$$

$$\frac{(\sqrt{3}-1)}{2\sqrt{2}}\cos x+\frac{(\sqrt{3}+1)}{2\sqrt{2}}\sin x=\frac{1}{2}.$$

$$\cos\left(x-\frac{5\pi}{12}\right)=\frac{1}{2}.$$

$$x-\frac{5\pi}{12}=-\frac{\pi}{3},\frac{\pi}{3}$$

$$x=\frac{\pi}{12},\ \cancel{\frac{3\pi}{4}}$$

$$\boxed{x=2n\pi+\frac{\pi}{12},\ n\in I}$$

$$2+\underline{2\sin^2\theta}-2\cos\theta-\underline{4\sin\theta}+2\sin\theta\cos\theta=0$$

$$2(1-\sin\theta)^2+2\cos\theta(\sin\theta-1)=0$$

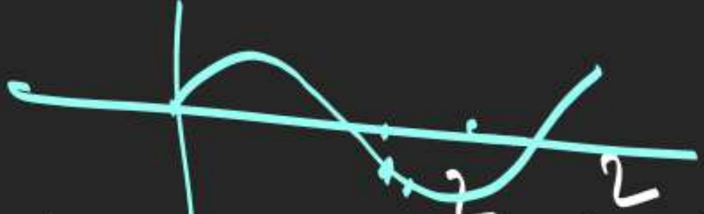
Nishant Jindal

10.

$a\cos\theta + b\sin\theta = c$

$(a\cos\theta)^2 = (c - b\sin\theta)^2$

$(b^2 + a^2)\sin^2\theta - 2bc\sin\theta + c^2 - a^2 = 0$



$(b^2 + a^2)x^2 - 2bcx + c^2 - a^2 = 0$ — $\sin\alpha$, $\sin\beta$

$\frac{-1}{\sqrt{2}(\cos 3 + \sin 3)} > 1$

$2 \boxed{\sin\left(3 + \frac{\pi}{4}\right)}$

$\boxed{\frac{7\pi}{6}}$

15. $\frac{2 \cdot \frac{1}{\sqrt{2}}}{\cos 3 + \sin 3} < 0$ $\quad \frac{\cos\frac{2\pi}{4}}{2}$

$-\frac{1}{\sqrt{2}}$

$\frac{\cos\frac{2\pi}{4}}{\cos 3 + \sin 3} < 0$

$5\pi + \frac{\pi}{4}$

$\sin x - \cos x + \cos x + \sin x = \sqrt{2}$

$\boxed{\sin x = \frac{1}{\sqrt{2}}}$

$\frac{\pi}{4}, \frac{3\pi}{4}$

$\boxed{2\pi}$

$2\pi + \frac{\pi}{4}$

$\boxed{2n\pi + \frac{3\pi}{4},\ n \in I}$

12. $a = \boxed{f(t)} \rightarrow$ Quadratic

$t \in [-1, 1]$

$-1 \quad 1 \quad t$

Nishant Jindal

Determinant

$$D = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ \cancel{a_{21}} & \cancel{a_{22}} & \cancel{a_{23}} \\ a_{31} & \boxed{a_{32}} & a_{33} \end{vmatrix}$$

$$|-3| = -3$$

Minors

$$M_{11} = \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}$$

$$M_{23} = \begin{vmatrix} a_{11} & a_{12} \\ a_{31} & a_{32} \end{vmatrix}$$

Cofactors

$$C_{ij} = (-1)^{i+j} M_{ij}$$

$$C_{23} = -M_{23}$$

Let:

$$\begin{vmatrix} \cancel{a_{12}} & \cancel{a_{13}} \\ a_{32} & a_{33} \end{vmatrix} = a_{12}a_{33} - a_{13}a_{32}$$

$$-a_{21}\begin{vmatrix} a_{12} & a_{13} \\ a_{32} & a_{33} \end{vmatrix} + a_{22}\begin{vmatrix} \checkmark \end{vmatrix} - a_{23}\begin{vmatrix} \checkmark \end{vmatrix}$$

$$D = a_{21}\underline{C_{21}} + a_{22}C_{22} + a_{23}C_{23}$$

Nishant Jindal

Properties

*

$$\begin{vmatrix} \cancel{a_{11}} & \cancel{a_{12}} & \cancel{a_{13}} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = \begin{vmatrix} a_{11} & a_{21} & a_{31} \\ a_{12} & a_{22} & a_{32} \\ a_{13} & a_{23} & a_{33} \end{vmatrix}$$

*

$$\begin{vmatrix} Ka_{11} & a_{12} & a_{13} \\ Ka_{21} & a_{22} & a_{23} \\ Ka_{31} & a_{32} & a_{33} \end{vmatrix} = K \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

*

* Scalar Multiplication

Nishant Jindal

* Sum of two determinants

$$\begin{vmatrix} a_1+d_1 & a_2+d_2 & a_3+d_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} + \begin{vmatrix} d_1 & d_2 & d_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

$$\begin{vmatrix} a_1+d_1 & a_2+d_2 & a_3+d_3 \\ b_1+e_1 & b_2+e_2 & b_3+e_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1+e_1 & b_2+e_2 & b_3+e_3 \\ c_1 & c_2 & c_3 \end{vmatrix} + \begin{vmatrix} d_1 & d_2 & d_3 \\ b_1+e_1 & b_2+e_2 & b_3+e_3 \\ c_1 & c_2 & c_3 \end{vmatrix} =$$

Nishant Jindal

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = D$$

$$\begin{vmatrix} c_1 & c_2 & c_3 \\ b_1 & b_2 & b_3 \\ a_1 & a_2 & a_3 \end{vmatrix} = D'$$

$$\boxed{D' = -D}$$

Nishant Jindal

Row/ Column transformation

$R_2 \to R_2 - R_1$

$R_3 \to R_3 - R_1$

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 + \boxed{k_2 b_1 + k_3 c_1} & a_2 + \boxed{k_2 b_2 + k_3 c_2} & a_3 + \boxed{k_2 b_3 + k_3 c_3} \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

$R_1 \to R_1 + k_2 R_2 + k_3 R_3$.

$R_1 \to k_1 R_1 + k_2 R_2 + k_3 R_3$.

$$\text{RHS} = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} + k_2 \begin{vmatrix} b_1 & b_2 & b_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} + k_3 \begin{vmatrix} c_1 & c_2 & c_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

$0 \qquad 0$

$$\frac{1}{k_1} \begin{vmatrix} k_1 a_1 + k_2 b_1 + k_3 c_1 & - & - \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

Nishant Jindal

$$\Delta = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = \frac{1}{k_1}\begin{vmatrix} k_1a_1 & k_1a_2 & k_1a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$$

$R_1 \to R_1 + k_2R_2 + k_3R_3$

Ex-I (16-21) $\rightarrow$ TE.

Ex-II