Nishant Jindal

$b, c, a \neq 0$

$\{1, 2, \dots, p-1\}$

$a \to p-1$

$b \to p-1$

$a^2 - bc \ /p$

$a^2 = p\lambda + R$

$(p-1)(p-1) \times 1$

bc

b

$2b$

$3b$

$\vdots$

$(p-1)b$

$\underline{\underline{\text{adj} P}} = \{ \quad \}$

$|P|^2 = | \quad |$

$P^T = 2P + I$

$P = 2P^T + I$

$P = ?$

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$$M^2 - N^4 = 0$$

$$(M - N^2)(M + N^2) = 0$$

$$\boxed{|M + N^2| = 0}$$

$$MN = NM$$

$$MNN = NMN$$

$$MN^2 = NNM$$

$$= N^2M$$

$$\boxed{4K} \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} \leq \boxed{6}$$

$R_2 - R_1$

$R_3 - R_1$

$$A^2 = \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix} \leq 4$$

$$|A|^2 =$$

$$(M^2 + MN^2)U = 0$$

$$\begin{bmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

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$$(\operatorname{adj} M)^{-1} = -\frac{M}{2}$$

$$M^{-1}\,\underbrace{\operatorname{adj}(M^{-1})} = |M^{-1}|\, I = -\frac{1}{2} I$$

$$\boxed{\operatorname{adj}(M^{-1}) = -\frac{M}{2}}$$

$$M \operatorname{adj} M = |\underline{M}|\, I = -2 I$$

$$\left(\frac{M}{-2}\right)(\operatorname{adj} M) = I$$

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$$|R| = |Q| = \begin{vmatrix} 2 & x & x \\ 0 & 4 & 0 \\ x & x & 5 \end{vmatrix} + \begin{vmatrix} 2 & x & 0 \\ 0 & 4 & 0 \\ x & x & 1 \end{vmatrix}$$

$$|R| = |Q| = \begin{vmatrix} 2 & & \\ 0 & 4 & 0 \\ & & 6 \end{vmatrix} \neq 0$$

$$\begin{bmatrix} & & \\ & & \\ & & \end{bmatrix} \begin{bmatrix} 2 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 6 \end{bmatrix} \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}^{-1}$$

$$R - 6I$$

$$R \begin{bmatrix} \alpha \\ \beta \\ \gamma \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\cancel{Q \begin{bmatrix} & \end{bmatrix}} \begin{bmatrix} \alpha \\ \beta \\ \gamma \end{bmatrix} = \begin{bmatrix} 0 \\ 6 \\ 0 \end{bmatrix}$$

Nishant Jindal

$X = \sum P_k Q P_k^T$ ✓

$X^T = \sum P_k \cancel{Q^T} P_k^T$

Q

$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 2 & 1 & 3 \\ 1 & 0 & 2 \\ 3 & 2 & 1 \end{bmatrix}$

$\begin{bmatrix} 2 & 1 & 3 \\ 1 & 0 & 2 \\ 3 & 2 & 1 \end{bmatrix}$

$\boxed{(X - 30I)A = 0}$

$A = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

$\underline{XA} = \sum P_k Q \underbrace{\boxed{P_k^T A}}_{\boxed{3\times 1}}$ 3×1 3×3 $= \left(\sum P_k\right)(QA)$

$\boxed{XA = \alpha A}$

$= 2\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} QA = 2\begin{bmatrix} 6 & 3 & 6 \\ 6 & 3 & 6 \\ 6 & 3 & 6 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

$= 2\begin{bmatrix} 15 \\ 15 \\ 15 \end{bmatrix}$

Nishant Jindal

$M^{-1} = \underline{\operatorname{adj}(\operatorname{adj} M)} = |M|^{n-2} M = |M| M.$

$M(\operatorname{adj} M) = \frac{\operatorname{adj} M}{|M| I = I}.$ $M^{-1} = |M| M = M.$

$\boxed{M^2 = I}$

$(\operatorname{adj} M)^{-1} = \frac{M}{|M|} = |\operatorname{adj} M|^2 = |M|^4$

$\boxed{|M| = 1}$

$\operatorname{adj}(\operatorname{adj} M) = (\operatorname{adj} M)^{-1}$
$= M.$

$(\operatorname{adj} M) \operatorname{adj}(\operatorname{adj} M) = \underbrace{|\operatorname{adj} M|}_{} I.$
$= I.$

—

Nishant Jindal

$PF = P^2EP = EP$

$\boxed{F = PEP}$

$G(I-EF) = I = (I-EF)G$

$GEF = EFG$

$P^2 = I$

$\boxed{P^{-1}FP = E}$ $\quad P^{-1}F = EP^{-1}$

$G - GEF = I$

$FG - FGEF = F$

$FGE - FGEFE = FE$

$FGE(I-FE) = FE$

$|EQ + PFQ^{-1}|$

$= |EQ + EPQ^{-1}|$

$= |E|\,|Q + PQ^{-1}|$

0

$I = G - EFG$

$E = GE - EFGE$

$FE = FGE - FEFGE$

$FE = (I-FE)FGE$

$\cancel{I} + FGE - FE(I + FGE) = \cancel{I}$

$FE = FGE(I-FE)$

Nishant Jindal

$$\int \sin^4 x \cos^2 x \, dx = \frac{1}{8}\int \sin^2 2x \,(1 - \cos 2x)$$

$$= \frac{1}{16}\int \left[(1-\cos 4x) - \sin^2 2x\,(2\cos 2x)\right] dx$$

$$= \frac{1}{16}\left(x - \frac{\sin 4x}{4} - \frac{\sin^3 2x}{3}\right) + C.$$

Nishant Jindal

$\sqrt{a^2-x^2}$ $\quad x = a\sin\theta$

$\sqrt{x^2-a^2}$ $\quad x = a\sec\theta$

$\sqrt{a^2+x^2}$ $\quad x = a\tan\theta$

$\sqrt{\frac{a-x}{a+x}}$ $\quad x = a\cos\theta$

$$\boxed{\begin{aligned}\int \frac{dx}{\sqrt{x^2+a^2}} &= \ln\left|x+\sqrt{x^2+a^2}\right|+C \\ \int \frac{dx}{\sqrt{x^2-a^2}} &= \ln\left|x+\sqrt{x^2-a^2}\right|+C \checkmark\end{aligned}}$$

$x = a\sec\theta$

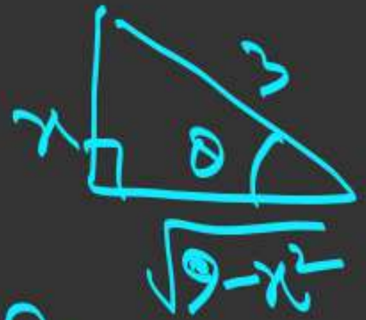
$dx = a\sec\theta\tan\theta\, d\theta$ $\qquad I = \int \frac{\cancel{a}\sec\theta\tan\theta\, d\theta}{\cancel{a}\tan\theta}$

$\ln\left|x+\sqrt{x^2-a^2}\right| - \ln a + C = \ln\left|\frac{x}{a}+\sqrt{\frac{x^2}{a^2}-1}\right| + C = \ln|\sec\theta+\tan\theta| + C.$

1. $$\int \frac{\sqrt{(9-x^2)^3}}{x^6}\,dx$$

$x = 3\sin\theta$

$dx = 3\cos\theta\, d\theta$



$$= \int \frac{(3\cos\theta)^3\, 3\cos\theta\, d\theta}{(3\sin\theta)^6} = -\frac{1}{9}\int \cot^4\theta \cdot (-\operatorname{cosec}^2\theta)\, d\theta$$

$$= -\frac{1}{45}\cot^5\theta + C = -\frac{1}{45}\left(\frac{\sqrt{9-x^2}}{x}\right)^5 + C.$$

$$\int \frac{1}{x^3}\left(\frac{9}{x^2}-1\right)^{3/2} dx = -\frac{1}{18}\int -\frac{18}{x^3}\left(\frac{9}{x^2}-1\right)^{3/2} dx$$

$$= -\frac{1}{18}\cdot\frac{2}{5}\left(\frac{9}{x^2}-1\right)^{5/2} + C$$

Nishant Jindal

2\. $\int \frac{dx}{\sqrt{-2x^2+3x+2}} = \int \frac{dx}{\sqrt{2-2\left(\left(x-\frac{3}{4}\right)^2-\frac{9}{16}\right)}}$

$\boxed{\text{upto } 1831}$

$-2\left(x^2-\frac{3}{2}x\right)$

3\. $\int \frac{x^2\,dx}{\sqrt{a^6-x^6}}$

$= \int \frac{dx}{\sqrt{\frac{25}{8}-2\left(x-\frac{3}{4}\right)^2}}$

Differentiation

$\{x-[(1-15)$

$\frac{1}{\sqrt{2}}\sin^{-1}\left(\frac{x-\frac{3}{4}}{\frac{5}{4}}\right)+C = \frac{1}{\sqrt{2}}\int \frac{dx}{\sqrt{\frac{25}{16}-\left(x-\frac{3}{4}\right)^2}}$

$2+\frac{9}{8}$