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Paper-1 ✓

square

$\boxed{AB = O}$

$|A||B| = |AB| = 0$

$|A| \neq 0$ ✗

$A^{-1}AB = A^{-1}O$

$B = O$

$adj(adj A) = |A|^{n-2} A = |A| A$

$A^T \, adj A^T = |A^T| I$.

$A^T (adj A^T) = |A^T| I$.

$A^T \, (adj A)^T$

$(A^{-1})^T = (A^T)^{-1}$

$(kA)^T = kA^T$

$\left(\frac{adj A}{|A|}\right)^T = \frac{adj A^T}{|A^T|}$

$\Rightarrow \frac{1}{\cancel{|A|}}(adj A)^T = \frac{adj(A^T)}{\cancel{|A|}}$

$D^2 = \begin{bmatrix} d_1 & 0 & 0 & \cdot & 0 \\ 0 & d_2 & & & \\ \vdots & & \ddots & & \\ 0 & 0 & \cdots & 0 & d_n \end{bmatrix} \begin{bmatrix} d_1 & 0 & \cdots & 0 \\ 0 & d_2 & \cdots & 0 \\ \vdots & & & \\ 0 & 0 & \cdots & d_n \end{bmatrix}$

$= \begin{bmatrix} d_1^2 & 0 & \cdots & 0 \\ 0 & d_2^2 & 0 \cdots & 0 \\ \vdots & & & \\ 0 & 0 & \cdots & d_n^2 \end{bmatrix}$

$AA^{-1} = I$

$|A||A^{-1}| = |AA^{-1}| = 1$

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$$\begin{bmatrix} ap+bq \\ cp+dq \end{bmatrix} = \begin{bmatrix} p \\ q \end{bmatrix}$$

$ap+bq=p \Rightarrow (a-1)p+bq=0$

$cp+dq=q \Rightarrow cp+(d-1)q=0$

$$\begin{bmatrix} a+2c & b+2d \\ 3a+4c & 3b+4d \end{bmatrix} = \begin{bmatrix} a+3b & 2a+4b \\ c+3d & 2c+4d \end{bmatrix}$$

$3b=2c$ ✓

$$\begin{vmatrix} a-1 & b \\ c & d-1 \end{vmatrix} = 0$$

$$\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad \begin{bmatrix} -1 & -1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} -1 & 1 \\ -1 & -1 \end{bmatrix}$$

-1 ✓

1 ✓

$xy+ \quad yz+ \quad zx$

$(\ )x+(\ )y+(\ )z=0$

$=$

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$a_{11}a_{21}=1$

$a_{12}a_{22}=-1$

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$$3y - 3x - 2z = 2$$
$$x + yz = 0$$
$$y - xz = 6$$

$$\Rightarrow \underline{3y} + \underline{3yz} - 2z = 2$$
$$(1+z)(3y-2) = 0$$

$$A^2 = I$$
$$A^3 = A$$
$$A^4 = A^2 = I$$

$$(\cos^2\theta + \cos^4\theta + \cos^6\theta + \dots)$$
$$+ (\sin^2\theta + \sin^4\theta + \dots)$$
$$= \cot^2\theta + \tan^2\theta$$

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Matrices

$\boxed{\text{Ex} - \text{II}/\text{III}}$

$l =$

$$\begin{bmatrix} a_{11} & & & \\ 0 & a_{22} & & \\ 0 & & \ddots & \\ \vdots & & & \\ 0 & 0 & \cdots\, 0 & a_{nn} \end{bmatrix}$$

$$l = 1 + \left(n + (n-1) + (n-2) + \cdots + 1 \right)$$

$$m = n + 1$$

$$p = 1 + 2 + 3 + \cdots + (n-1)$$

$$\underset{1\times1}{D} = \underset{1\times2}{\begin{bmatrix} 5 & -3 \end{bmatrix}} \underset{2\times2}{\begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}} \underset{2\times2}{\begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}} \underset{2\times1}{\begin{bmatrix} 5 \\ -3 \end{bmatrix}}$$

$$\int \frac{x^4 \overset{+1}{-1}}{1+x^2}\,dx = \int\left(x^2-1+\frac{1}{1+x^2}\right)dx = \frac{x^3}{3} - x + \tan^{-1}x + C.$$

$$\int \frac{dx}{\sqrt{9-4x^2}} = \frac{1}{2}\int \frac{dx}{\sqrt{\frac{9}{4}-x^2}} = \frac{1}{2}\sin^{-1}\left(\frac{x}{3/2}\right) + C$$

$$(x^2-4x+5)-(x^2-4x+4)$$

$$\int \frac{dx}{(x^2-4x+4)(x^2-4x+5)} = \int\left(\frac{1}{(x-2)^2} - \frac{1}{(x-2)^2+1}\right)dx$$

$$= -\frac{1}{x-2} - \tan^{-1}(x-2) + C.$$

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$$\int \frac{dx}{(2x-7)\sqrt{(x-3)(x-4)}} = \frac{1}{2}\int \frac{dx}{\left(x-\frac{7}{2}\right)\sqrt{\left(x-\frac{7}{2}\right)^2-\frac{1}{4}}}$$

$x^2-7x+12$

$$= \frac{1}{2} \times \frac{1}{1/2} \sec^{-1}\left(\frac{x-\frac{7}{2}}{1/2}\right) + C$$

$$= \sec^{-1}(2x-7) + C$$