



MATHS

BOOKS - TELUGU ACADEMY MATHS (TELUGU ENGLISH)

IPE:MARCH-2015[AP]

Section A Vsaq

1. If $f: R \rightarrow (0, \infty)$ defined by $f(x) = 5^x$, then find $f^{-1}(x)$

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2. Find the domains of the real valued function

$$f(x) = \frac{1}{\sqrt{x^2 - a^2}}, (a > 0)$$

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3. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 8 \\ 7 & 2 \end{pmatrix}$ and $2X + A = B$, then find X.

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4. For any square matrix A, show that AA' is symmetric.

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5. If $\vec{a} = 2\vec{i} + 4\vec{j} - 5\vec{k}$, $\vec{b} = \vec{i} + \vec{j} + \vec{k}$ and $\vec{c} = \vec{j} + 2\vec{k}$. Find the unit vector in the opposite direction of $\vec{a} + \vec{b} + \vec{c}$.

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6. Find the vector equation of the line passing through the point $2\bar{i} + 3\bar{j} + \bar{k}$ and parallel to the vector $4\bar{i} - 2\bar{j} + 3\bar{k}$

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7. If $\bar{a} = \bar{i} + 2\bar{j} - 3\bar{k}$ and $\bar{b} = 3\bar{i} - \bar{j} + 2\bar{k}$, then show that $\bar{a} + \bar{b}$ and $\bar{a} - \bar{b}$ are and perpendicular to each other .

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8. Find the period of $\tan(x + 4x + 9x + \dots + n^2x)$ (n any positive integer)

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9. Prove that $\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ} = \cot 36^\circ$

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10. S.T $\frac{\tanh^{-1} 1}{2} = \frac{1}{2} \log_e 3.$

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Section B Saq

1. If $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $E = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ then show that $(aI + bE)^3 = a^3I + 3a^2bE$ where I is identify matrix of order 2.

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2. If ABCDEF is a regular hexagon with centre O , then P.T

$$\overline{AB} + \overline{AC} + \overline{AD} + \overline{AE} + \overline{AF} = 3\overline{AD} = 6\overline{AO}$$

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3. If $\bar{a} = 2\bar{i} + \bar{j} - \bar{k}$, $\bar{b} = -\bar{i} + 2\bar{j} - 4\bar{k}$, $\bar{c} = \bar{i} + \bar{j} + \bar{k}$ then find $(\bar{a} \times \bar{b}) \cdot (\bar{b} \times \bar{c})$.

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4. Prove that

$$\left(1 + \cos \frac{\pi}{10}\right) \left(1 + \cos \frac{3\pi}{10}\right) \left(1 + \cos \frac{7\pi}{10}\right) \left(1 + \cos \frac{9\pi}{10}\right) = \frac{1}{16}$$

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

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6. Prove that $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$

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7. In a ΔABC show that $\frac{b^2 - c^2}{a^2} = \frac{\sin(B - C)}{\sin(B + C)}$

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Section C Saq

1. If $f: A \rightarrow B$ is a bijective function then prove that

(ii) $f^{-1} \circ f = I_A$.

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2. Using Mathematical Induction, prove that statement for all $n \in$

\mathbb{N}

$$\left(1 + \frac{3}{1}\right) \left(1 + \frac{5}{4}\right) \left(1 + \frac{7}{9}\right) \dots \left(1 + \frac{2n+1}{n^2}\right) = (n+1)^2.$$



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3. Show that
$$\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 2 \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$



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4. Solve the equations $3x + 4y + 5z = 18$, $2x - y + 8z = 13$, $5x - 2y + 7z = 20$ by Gauss-Jordan method.



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5. Prove that $\bar{a}x [\bar{a}x (\bar{a}x \bar{b})] = (\bar{a} \cdot \bar{a}) (\bar{b}x \bar{a})$.



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6. If $A + B + C = \pi$, then prove that

$$\cos^2\left(\frac{A}{2}\right) + \cos^2\left(\frac{B}{2}\right) + \cos^2\left(\frac{C}{2}\right) = 2\left(1 + \sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}\right)$$

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7. In a $\triangle ABC$ if $a = 13, b = 14, c = 15$ then S.T

$$R = \frac{65}{8}, r = 4, r_1 = \frac{21}{2}, r_2 = 12, r_3 = 14.$$

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