NATHU RAM CONVENT SR. SEC. SCHOOL

HOLIDAYS HOME WORK FOR CLASS-XII
SUBJECT: MATHEMATICS
(COMMERCE AND HUMANITIES)

1. Write and learn all the formulae of trigonometry.
2. Write and learn all the formulae of inverse trigonometric functions.
3. Do practice of chapter 2,3 and 4 from NCERT.

ASSIGNMENTS

- Solve the following assignments:-

MATRICES

1. *If* $\begin{bmatrix} x-y & 2y \\ 2y+z & x+y \end{bmatrix} = \begin{bmatrix} 1 & 4 \\ 9 & 5 \end{bmatrix}$ *then write the value of* $(x+y+z)$ $[x+y+z=10]$
2. *Find the value of* x *and* y, *if* $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$. [X=3, Y=3]
3. *Find* X *such that* $X\begin{bmatrix} 5 & -7 \\ -2 & 3 \end{bmatrix} = \begin{bmatrix} -16 & -6 \\ 7 & 2 \end{bmatrix}$ $\left\{\begin{bmatrix} -60 & -142 \\ 25 & 59 \end{bmatrix}\right\}$
4. *If* $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$, *then prove that* $A^3 - 4A^2 + A = 0$
5. *Find the value of* x *such that:* $\begin{bmatrix} 1 & 1 & x \end{bmatrix}\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = 0$ [x=-2]
6. *For what value of* x *is the matrix* $A = \begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ x & -3 & 0 \end{bmatrix}$ *a skew − symmetric matrix*
7. Using elementary row operation, find the inverse of :
   (a) $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}\left\{\begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}\right\}$
   (b) $\begin{bmatrix} 2 & -3 & 3 \\ 2 & 2 & 3 \\ 3 & -2 & 2 \end{bmatrix}\left\{\frac{1}{5}\begin{bmatrix} -2 & 0 & 3 \\ -1 & 1 & 0 \\ 2 & 1 & -2 \end{bmatrix}\right\}$

DETERMINANTS

1. $If\ A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 2 \\ 3 & 1 & 1 \end{bmatrix}, find\ A^{-1}. Using\ A^{-1}\ solve\ the\ following\ system\ of\ linear\ equations:$

$$x + y + z = 6, x + 2z = 7, 3x + y + z = 12\ [x = 3, y = 1, z = 2]$$

2. *Solve the equations using matrix method:*

$$2x + 8y + 5z = 5$$
$$x + y + z = -2$$
$$x + 2y - z = 2\ [x = -3, y = 2, z = -1]$$

3. $If A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}, show\ that: A^2 - 5A + 7I = 0. Hence, find\ A^{-1}.\ \left\{\frac{1}{7}\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}\right\}$

4. Using properties of determinants, show that:

$$\begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix} = (a-b)(b-c)(c-a)$$

5. Using properties of determinants, show that:

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$$

6. Using properties of determinants, show that:

$$\begin{vmatrix} x & x+y & x+2y \\ x+2y & x & x+y \\ x+y & x+2y & x \end{vmatrix} = 9y^2(x+y)$$

7. Using properties of determinants, show that:

$$\begin{vmatrix} x & x^2 & yz \\ y & y^2 & zx \\ z & z^2 & xy \end{vmatrix} = (x-y)(y-z)(z-x)(xy+yz+zx)$$

8. Using properties of determinants, show that:

$$\begin{vmatrix} b+c & c+a & a+b \\ q+r & r+p & p+q \\ y+z & z+x & x+y \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$$

INVERSE TRIGONOMETRIC FUNCTIONS

1. Evaluate:

(i) $\cos\left\{\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)+\frac{\pi}{4}\right\}$	(ii) $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)$	(iii) $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right)\left[\frac{\pi}{4}+\frac{x}{2}\right]$	(iv) $\tan\left(2\tan^{-1}\frac{1}{5}\right)$

2. Prove that:

(i) $\tan^{-1}\left\{\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right\}=\frac{\pi}{2}-\frac{x}{2}$	(ii) $\tan^{-1}\left\{\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right\}=\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x^2$
(iii) $2\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{8}=\tan^{-1}\frac{4}{7}$	(iv) $\sin^{-1}\frac{8}{17}+\sin^{-1}\frac{3}{5}=\tan^{-1}\frac{77}{36}$

3. *If* $\cos^{-1}\frac{x}{a}+\cos^{-1}\frac{y}{b}=\alpha$, *prove that* $\frac{x^2}{a^2}-\frac{2xy}{ab}\cos\alpha+\frac{y^2}{b^2}=\sin^2\alpha$