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Subject: Maths **Class: 12th** **Topic: Holiday Assignment**

Find the principle value of following function:

1. $\text{Sin}^{-1}\left(\frac{1}{\sqrt{2}}\right)$
2. $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$
3. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$
4. $\text{cosec}^{-1}\sqrt{2}$
5. Express $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right)$, $\frac{-3\pi}{2} < x < \frac{\pi}{2}$ in the simplest form.
6. Express $\tan^{-1}\left(\frac{3a^2x-x^3}{a^3-3ax^2}\right)$, $a>0$; $\frac{a}{\sqrt{3}} < x < \frac{a}{\sqrt{3}}$ in the simplest form.

Find the values of each of the following:

7. $\tan^{-1}\left[2cos\left(2\ sin^{-1}\frac{1}{2}\right)\right]$
8. $\cot(\tan^{-1}a + \cot^{-1}a)$

Prove that:

9. $\cos^{-1}\frac{4}{5}+\cos^{-1}\frac{12}{13}=\cos^{-1}\frac{33}{65}$
10. $\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$
11. Construct a 2×2 matrix whose elements are given by $a_{ij} = 2i + 3j$.
12. Construct a 2×3 matrix whose elements are given by $a_{ij} = 3i - \frac{3}{2}j$.
13. If $\begin{bmatrix} a+b & 4 \\ -3 & ab \end{bmatrix} = \begin{bmatrix} 6 & 4 \\ -3 & 8 \end{bmatrix}$, then find the value of a and b.

Find the values of *x*, *y* and *z* from the following equations:

14. $\begin{bmatrix} 4 & 3 \\ x & 5 \end{bmatrix} = \begin{bmatrix} y & z \\ 1 & 5 \end{bmatrix}$
15. $\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$

16.Find X and Y, if X+ Y = $\begin{bmatrix}5 & 25\\0 & 9\end{bmatrix}$ and X – Y = $\begin{bmatrix}3 & 6\\0 & -1\end{bmatrix}$

17.If A = $\begin{bmatrix}8 & 0\\4 & -2\\3 & 6\end{bmatrix}$ and B = $\begin{bmatrix}2 & -2\\4 & 2\\-5 & 1\end{bmatrix}$, then find the matrix X, such that 2A + 3X = 5B.

18.If $A=\begin{bmatrix}0 & 6 & 7\\-6 & 0 & 8\\7 & -8 & 0\end{bmatrix}, B=\begin{bmatrix}0 & 1 & 1\\1 & 0 & 2\\1 & 2 & 0\end{bmatrix}, C=\begin{bmatrix}2\\-2\\3\end{bmatrix}$, calculate AC, BC and (A+B)C. Also verify that (A+B)C = AC + BC

19.If A = $\begin{bmatrix}1 & 2 & 3\\3 & -2 & 1\\4 & 2 & 1\end{bmatrix}$, then show that $A^3 – 23A – 40I = 0$

20.Solve the equation for *x*, *y*, *z* and *t*, if $2\begin{bmatrix}x & z\\y & t\end{bmatrix} + 3\begin{bmatrix}1 & -1\\0 & 2\end{bmatrix} = 3\begin{bmatrix}3 & 5\\4 & 6\end{bmatrix}$

21.Find $A^2 – 5A + 6I$, if A = $\begin{bmatrix}2 & 0 & 1\\2 & 1 & 3\\1 & -1 & 0\end{bmatrix}$

22.Given $3\begin{bmatrix}x & y\\z & w\end{bmatrix}=\begin{bmatrix}x & 6\\-1 & 2w\end{bmatrix}+\begin{bmatrix}4 & x+y\\z+w & 3\end{bmatrix}$, find the values of x, y, z and w.

23.Evaluate the determinants $\begin{vmatrix}2 & -1 & -2\\0 & 2 & -1\\3 & -5 & 0\end{vmatrix}$

24.Find values of *x*, if $\begin{vmatrix}2 & 4\\5 & 1\end{vmatrix}=\begin{vmatrix}2x & 4\\6 & x\end{vmatrix}$

25.Show that

$$\begin{vmatrix}1+a & 1 & 1\\1 & 1+b & 1\\1 & 1 & 1+c\end{vmatrix}=abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)=abc+bc+ca+ab$$

26.Evaluate the determinant $\begin{vmatrix}1/a & a^2 & bc\\1/b & b^2 & ca\\1/c & c^2 & ab\end{vmatrix}$

$$\begin{vmatrix}x+a & b & c\\c & x+b & a\\a & b & x+c\end{vmatrix}=0$$

27.Solve the equation

28.Prove that $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2 = \begin{vmatrix} 2bc-a^2 & c^2 & b^2 \\ c^2 & 2ac-b^2 & a^2 \\ b^2 & a^2 & 2ab-c^2 \end{vmatrix}$

29.Solve the following determinant: $\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ x-4 & 2x-9 & 3x-16 \\ x-8 & 2x-27 & 3x-64 \end{vmatrix} = 0.$

30. $\begin{vmatrix} a+b+c & -c & -b \\ -c & a+b+c & -a \\ -b & -a & c+a+b \end{vmatrix} = 2(a+b)(b+c)(c+a).$

31.Prove that one root of the equation is x =2 and hence find the remaining roots

$$\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0.$$

32.Evaluate the determinant: $\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix}$

33. If matrix $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$ then prove that $(AB)^{-1} = B^{-1}A^{-1}$.

34. If $A = \begin{bmatrix} 5 & 0 & 4 \\ 2 & 3 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ and $B^{-1} = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ then find $(AB)^{-1}$

35.If the solution of two below given equation is possible then solve using the Cramer's rule.

(i) $2x-3y=3$
$2x+3y=9$

(ii) $x+2y=5$
$2x+4y=10$

36. Solve the following system of equations

$$\begin{bmatrix} 3 & 0 & 3 \\ 2 & 1 & 0 \\ 4 & 0 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 1 \\ 4 \end{bmatrix} + \begin{bmatrix} 2y \\ z \\ 3y \end{bmatrix}$$

37. Find the value of *k* if the area of triangle is 35 Sq. units and the vertices are (*k*, 4) (2, –6) and (5, 4).

38. Using determinants find the value of *k* if the points (*k*, 2 –2 *k*), (–*k* + 1, 2*k*) and (–4 – *k*, 6 –2*k*) are collinear.

39. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{bmatrix}$ then find A^{-1} and solve the system of equations:

$$x - 2y = 10, \quad 2x + y + 3z = 8, \quad -2y + z = 7.$$

40. If the points $(2, -3), (\lambda, -2)$ and $(0, 5)$ are collinear then find the vlaue of λ.

Find the matrix A where

$$\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix} A \begin{bmatrix} 4 & 7 \\ 3 & 5 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Activity: (Total three activities)

Compulsory for all:

1. Prepare a chart on drawing sheet mentioning the detail and picture of Indian Mathematicians with their contribution in mathematics (any three).
   a) Acharya Aryabhata
   b) Acharya Brahmagupta
   c) Acharya Bhaskara II
   d) Acharya Varahamihir
   e) Shri S. Ramanujan
   f) Acharya Baudhayana
   g) Acharya Panini
   h) Shri Parameshvara

Do any two

2. Prepare a chart on drawing sheet mentioning all properties of Determinants with one example for each.

(Reference Chapter-4: Determinants)

3. Prepare a chart on drawing sheet mentioning formulas of Differentiations in proper tabular form. (any 12 formulas)
   (Reference Chapter-6 and 7: Differentiation)

4. Prepare a chart on drawing sheet mentioning formulas of integration in proper tabular form. (any 12 formulas)
   (Reference Chapter-9: Integration)

5. Prepare a chart on drawing sheet mentioning formulas of Vector and Three Dimensional Geometry in proper tabular form. (any 10 formulas)
   (Reference Chapter-13 and 14)