SREE VIDYANIKETHAN International School

Holiday Homework

Class: XII **Subject: Mathematics**

Inverse Trigonometric functions :

1. Prove that $2\sin^{-1}\theta = \sin^{-1}\left[2\theta\sqrt{1-\theta^2}\right]$. (4 Marks)
2. Write $\tan^{-1}\sqrt{\frac{1-\cos 3x}{1+\cos 3x}}$ in the simplest form (4 Marks)

   Ans : $\frac{3x}{2}$.
3. Solve $\sin^{-1}x + \sin^{-1}2x = \frac{\pi}{3}$. (4 Marks)

   Ans: x = $\frac{\sqrt{3}}{2\sqrt{7}}$.
4. Show that $\sin^{-1}\frac{3}{5} - \sin^{-1}\frac{8}{17} = \cos^{-1}\frac{84}{85}$. (4 Marks)
5. Show that $\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{4}{5} + \tan^{-1}\frac{63}{16} = \pi$. (4 Marks)
6. Prove that $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right) = \frac{x}{2}, x \in \left(0, \frac{\pi}{4}\right)$. (4 Marks)
7. Prove that $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x, -\frac{1}{\sqrt{2}} \le x \le 1$. (4 Marks)

Matrices :

8. If A = $\begin{bmatrix}1 & 3 & 5\\ -2 & 5 & 7\end{bmatrix}$ and 2A – 3B = $\begin{bmatrix}4 & 5 & -9\\ 1 & 2 & 3\end{bmatrix}$, then find B. (4 Marks)

   Ans: B = $\frac{1}{3}\begin{bmatrix}-2 & 1 & 19\\ -5 & 8 & 11\end{bmatrix}$.
9. Find x, if $\begin{bmatrix}x & 1\end{bmatrix}\begin{bmatrix}1 & 0\\ -2 & -3\end{bmatrix}\begin{bmatrix}x\\ 3\end{bmatrix} = O$. (4 Marks)

   Ans: x = $1 \pm \sqrt{10}$.
10. If A = $\begin{bmatrix}-1\\ 2\\ 3\end{bmatrix}$, B = $[-2 \quad -1 \quad -4]$, verify that $(AB)' = B'A'$. (4 Marks)
11. Express the matrix B = $\begin{bmatrix}2 & -2 & -4\\ -1 & 3 & 4\\ 1 & -2 & -3\end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

Determinants :

12. Compute A^{-1} for the matrix A = $\begin{bmatrix}2 & 3\\ 5 & -2\end{bmatrix}$ and show that $A^{-1} = \frac{1}{19}A$. (4 Marks)
13. Using the properties of determinants, prove that

$$\begin{vmatrix}y+z & x & y\\ z+x & z & x\\ x+y & y & z\end{vmatrix} = (x+y+z)(x-z)^2.$$ (4 Marks)

14. Using the properties of determinants, prove that $\begin{vmatrix}1 & x & x^2\\ x^2 & 1 & x\\ x & x^2 & 1\end{vmatrix} = (1-x^3)^2$. (4 Marks)

Note : Learn the Differentiation formulae which I sent to your tabs as Audio Video Lecturer.