

(of 4 marks)

1. If  $\cos^{-1} \frac{x}{a} + \cos^{-1} \frac{y}{b} = \beta$ , prove that  $\frac{x^2}{a^2} - \frac{2xy}{ab} \cos \beta + \frac{y^2}{b^2} = \sin^2 \beta$
2. Prove that  $\frac{1}{2} \tan^{-1} x = \cos^{-1} \left( \frac{\sqrt{1+\sqrt{1+x^2}}}{\sqrt{2\sqrt{1+x^2}}} \right)$
4. Prove that  $\tan^{-1} \left[ \frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}} \right] = \frac{\pi}{4} + \frac{1}{2} \cos^{-1} x^2$
5. Solve for x if  $\tan^{-1}(x+1) + \tan^{-1} x + \tan^{-1}(x-1) = \tan^{-1} 3$       Ans: x=-1
6. If  $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$ , prove that  
$$x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz$$

**CHAPTER 3 AND CHAPTER 4**  
**MATRICES AND DETERMINANTS**  
(of 1 mark)

1. Let A is an invertible square matrix of order 2 such that  $\det(A)=10$ , find the Value of  $\det(A^{-1})$       Ans. 1/10
2. If  $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$  then find  $A^{100}$       Ans.  $2^{99}A$
3. If A is a non singular matrix of order n, then write the value of  $\det(\text{Adj}(\text{adj}A))$  if order of A is 3 and  $|A| = 5$       Ans. 625

(of 4 marks)

1. Without expanding the determinant at any stage, show that

$$\begin{vmatrix} x^2 + x & x + 1 & x - 2 \\ 2x^2 + 3x - 1 & 3x & 3x - 3 \\ x^2 + 2x + 3 & 2x - 1 & 2x - 1 \end{vmatrix}$$

=  $xA + B$  where A and B are determinants of

Order 3 and not involving x.

2. Without expanding, evaluate  $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$  where

$x, y, z$  being positive.

3. The matrix X if  $\begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix} X \begin{bmatrix} 0 & 2 \\ 1 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 6 \\ 3 & -2 \end{bmatrix}$       An  $X = -\frac{1}{4} \begin{bmatrix} -53 & 18 \\ 25 & -10 \end{bmatrix}$