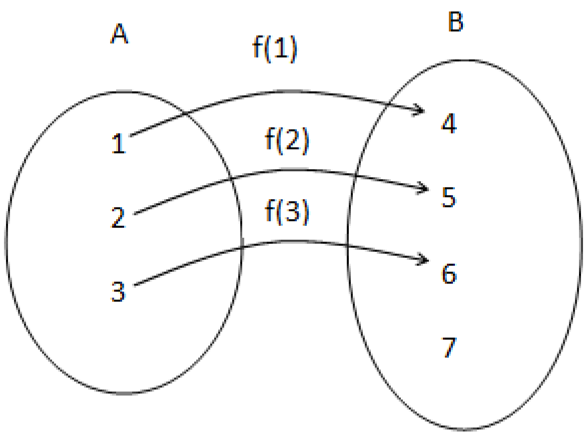
SECTION - A

Q1. Let A = {1,2,3}, B = {4,5,6,7} and let *f* = {(1,4), (2,5), (3,6)} be a function from A to B. State whether *f* is one-one or not.

Answer:



f = {(1, 4), (2, 5), (3, 6)}

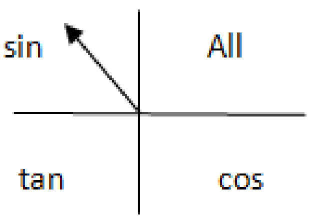
f (1) = 4, *f* (2) = 5, *f* (3) = 6.

Thus we find different points of the domain have different f-image in the range.

$\therefore f$ is one $-$ one.

Q2. What is the principal value of $\cos^{-1}\left(\cos\frac{2\pi}{3}\right)+\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$?

Answer:



$\cos^{-1}\left(\cos\frac{2\pi}{3}\right)+\sin^{-1}\left(\sin\frac{2\pi}{3}\right)$

$=\cos^{-1}\left[\cos\left(\pi-\frac{\pi}{3}\right)\right]+\sin^{-1}\left[\sin\left(\pi-\frac{\pi}{3}\right)\right]$

$=\cos^{-1}\left[-\cos\frac{\pi}{3}\right]+\sin^{-1}\left[\sin\frac{\pi}{3}\right]$

We know that cos(π-θ) = -cosθ and sin (π-θ) = sinθ

$=\pi-\cos^{-1}\left(\cos\frac{\pi}{3}\right)+\frac{\pi}{3}$

$=\pi-\frac{\pi}{3}+\frac{\pi}{3}=\pi$

Q3. Evaluate $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$

Answer: We have $\begin{vmatrix} \cos 15^\circ & \sin 15^\circ \\ \sin 75^\circ & \cos 75^\circ \end{vmatrix}$

$= \cos 75^\circ . \cos 15^\circ - \sin 75^\circ . \sin 15^\circ$

We know that $\cos a . \cos b - \sin a . \sin b = \cos(a+b)$

$= \cos(75^\circ + 15^\circ)$

$= \cos 90^\circ$

$= 0.$

Q4. If A = $\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, write A^{-1} in terms of A.

Answer: Here $|\mathrm{A}| = 2(-2) - 5 \times 3 = -4 - 15 = -19 \neq 0$

$\therefore\ A^{-1} = \frac{1}{|\mathrm{A}|} . \operatorname{adj} A$

[Note: We know that the adjoint of a square matrix A = [a_{ij}] is defined as the transpose of the matrix [A_{ij}] where A_{ij} is the co-factor of the element a_{ij}. Transpose of a matrix is obtained by interchanging rows and columns. Co-factor of each element is the determinant value of the matrix obtained by removing the row and column which contains the particular element. Adjoint of A is denoted by adj A]

We have A= $\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$

A_{11}=Co-factor of 2 = $(-1)^{1+1}(-2)$ =-2

A_{12}=co-factor of 3 = $(-1)^{1+2}(5)$ = -5

A_{21}=co-factor of 5 = $(-1)^{2+1}(3)$ =-3

A_{22}=co-factor of -2 = (-1)2+2(2) = 2

Therefore co-factor matrix =$\begin{bmatrix} -2 & -5 \\ -3 & 2 \end{bmatrix}$

adj A = Transpose of cofactor matrix =$\begin{bmatrix} -2 & -3 \\ -5 & 2 \end{bmatrix}$

Hence $A^{-1} = \frac{1}{|\mathrm{A}|} . \operatorname{adj} A$

$= \frac{1}{-19} \begin{bmatrix} -2 & -3 \\ -5 & 2 \end{bmatrix} = \frac{1}{19} \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$