

St. Mary's School, Dwarka
Holiday Homework
Class XII
Subject: Mathematics
Week 3
Worksheet 3
(Inverse Trigonometric Functions AND Matrices)

Q1 to Q 10 carry 1 mark each

Q1. The value of $\sin^{-1}\left(\cos\frac{33\pi}{5}\right)$ is

a. (a) $\frac{3\pi}{5}$ (b) $-\frac{\pi}{10}$ (c) $\frac{\pi}{10}$ (d) $\frac{7\pi}{5}$

Q2. The value of $\cos^{-1}\left(\cos\frac{5\pi}{3}\right) + \sin^{-1}\left(\sin\frac{5\pi}{3}\right)$ is

a. (a) $\frac{\pi}{2}$ (b) $\frac{5\pi}{3}$ (c) $\frac{10\pi}{3}$ (d) 0

Q3. $\sin\left\{2\cos^{-1}\left(\frac{-3}{5}\right)\right\}$ is equal to

a. (a) $\frac{6}{25}$ (b) $\frac{24}{25}$ (c) $\frac{4}{5}$ (d) $-\frac{24}{25}$

Q4. If $\theta = \sin^{-1}\{\sin(-600^\circ)\}$, then one of the possible value of θ is

a. (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) $-\frac{2\pi}{3}$

Q5. If $3\sin^{-1}\left(\frac{2x}{1+x^2}\right) - 4\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) + 2\tan^{-1}\left(\frac{2x}{1-x^2}\right) = \frac{\pi}{3}$ then x is equal to

a. (a) $\frac{1}{\sqrt{3}}$ (b) $-\frac{1}{\sqrt{3}}$ (c) $\sqrt{3}$ (d) $-\frac{\sqrt{3}}{4}$

Q6. If $4\cos^{-1}x + \sin^{-1}x = \pi$, then the value of x is

a. (a) $\frac{3}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{2}{\sqrt{3}}$

Q7. If $\tan^{-1}\frac{x+1}{x-1} + \tan^{-1}\frac{x-1}{x} = \tan^{-1}(-7)$, then the value of x is

a. (a) 0 (b) -2 (c) 1 (d) 2

Q8. If $\sin^{-1} x - \cos^{-1} x = \pi/6$, then $x =$

- a. (a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $-\frac{1}{2}$ (d) $-\frac{\sqrt{3}}{2}$

Q9. In a ΔABC , if C is a right angle, then

$$\tan^{-1}\left(\frac{a}{b+c}\right) + \tan^{-1}\left(\frac{b}{c+a}\right) =$$

a. (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{5\pi}{2}$ (d) $\frac{\pi}{6}$

Q10. The value of $\sin\left(\frac{1}{4}\sin^{-1}\frac{\sqrt{63}}{8}\right)$ is

- (a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\frac{1}{2\sqrt{2}}$ (d) $\frac{1}{3\sqrt{3}}$

Q11 to Q 15 carry 2 marks each

Q11. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I_2 = O$

Q12. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, $f(x) = x^2 - 2x - 3$, show that $f(A) = 0$

Q13. If $A = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & -1 & -4 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$.

Q14. If $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$, then verify that $A^T A = I_2$.

Q15. Express the matrix $A = \begin{bmatrix} 3 & 2 & 3 \\ 4 & 5 & 3 \\ 2 & 4 & 5 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrix.

CASE STUDY:

A manufacturer produces three stationery products Pencil, Eraser and Sharpener which he sells in two markets. Annual sales are indicated below:



Market	Products (in numbers)		
	<u>Pencil</u>	<u>Eraser</u>	<u>Sharpener</u>
A	10,000	2000	18,000
B	6000	20,000	8000

If the unit Sale price of Pencil, Eraser and Sharpener are Rs. 2.50, Rs. 1.50 and Rs. 1.00 respectively, and unit cost of the above three commodities are Rs. 2.00, Rs. 1.00 and Rs. 0.50 respectively, then –

$$1 \times 5 = 5$$

Based on the above information answer the following:

1. Total revenue of market A

- a. Rs. 64,000
- b. Rs. 60,400
- c. Rs. 46,000
- d. Rs. 40600

2. Total revenue of market B

- a. Rs. 35,000
- b. Rs. 53,000
- c. Rs. 50,300
- d. Rs. 30,500

3. Cost incurred in market A

- a. Rs. 13,000
- b. Rs. 30,100
- c. Rs. 10,300
- d. Rs. 31,000

4. Profit in market A and B respectively are

- a.(Rs. 15,000, Rs. 17,000)
- b.(Rs. 17,000, Rs. 15,000)
- c.(Rs. 51,000, Rs. 71,000)
- d.(Rs. 10,000, Rs. 20,000)

5. Gross profit in both market

- a. Rs.23,000
- b. Rs. 20,300
- c. Rs. 32,000
- d. Rs. 30,200