Term-I

CHAPTER 2

INVERSE TRIGONOMETRIC FUNCTIONS

Syllabus

- *Definition, range, domain, principal value branch.*

STAND ALONE MCQs (1 Mark each)

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

(A) $\frac{\pi}{10}$ (B) $\frac{3\pi}{5}$

(C) $-\frac{\pi}{10}$ (D) $\frac{-3\pi}{5}$

[CBSE OD Set-I 2020]

Ans. Option (C) is correct.

Explanation:

$$= \sin^{-1}\left[\cos\left(\frac{3\pi}{5}\right)\right]$$

$$= \sin^{-1}\left[\cos\left(\frac{\pi}{2}+\frac{\pi}{10}\right)\right]$$

$$= \sin^{-1}\left(-\sin\frac{\pi}{10}\right) \qquad \left[\because \cos\left(\frac{\pi}{2}+x\right)=-\sin x\right]$$

$$= -\sin^{-1}\left(\sin\frac{\pi}{10}\right) \qquad [\because \sin^{-1}(-x) = -\sin^{-1}x]$$

$$= -\frac{\pi}{10} \qquad \left[\because \sin^{-1}(\sin x)=x, x\in\left(\frac{-\pi}{2},\frac{\pi}{2}\right)\right]$$

Q. 2. The value of $\tan\left[\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right]$ is

(A) $\frac{3+\sqrt{5}}{2}$ (B) $\frac{3-\sqrt{5}}{2}$

(C) $\frac{-3+\sqrt{5}}{2}$ (D) $\frac{-3-\sqrt{5}}{2}$

Ans. Option (B) is correct.

Explanation:

$$x = \tan\left[\frac{1}{2}\cos^{-1}\left(\frac{\sqrt{5}}{3}\right)\right]$$

Let $\cos^{-1}\frac{\sqrt{5}}{3} = \theta$

$$\cos\theta = \frac{\sqrt{5}}{3}$$

$$\Rightarrow x = \tan\frac{1}{2}\theta$$

$$\Rightarrow x = \frac{\sin\frac{\theta}{2}}{\cos\frac{\theta}{2}}$$

$$\because \sin\frac{\theta}{2} = \frac{\sqrt{1-\frac{\sqrt{5}}{3}}}{\sqrt{2}}$$

$$\Rightarrow \cos\frac{\theta}{2} = \frac{\sqrt{1+\frac{\sqrt{5}}{3}}}{\sqrt{2}}$$

$$x = \frac{\sqrt{1-\frac{\sqrt{5}}{3}}}{\sqrt{1+\frac{\sqrt{5}}{3}}}$$

$$= \frac{\sqrt{3-\sqrt{5}}}{\sqrt{3+\sqrt{5}}}$$

$$= \frac{\sqrt{3-\sqrt{5}}}{\sqrt{3+\sqrt{5}}} \times \frac{\sqrt{3-\sqrt{5}}}{\sqrt{3-\sqrt{5}}}$$

$$= \frac{3-\sqrt{5}}{\sqrt{(3)^2-(\sqrt{5})^2}}$$

$$= \frac{3-\sqrt{5}}{\sqrt{9-5}}$$

$$= \frac{3-\sqrt{5}}{2}$$

Q. 3. Which of the following is the principal value branch of $\cos^{-1}x$?

(A) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ **(B)** $\left[0, \frac{\pi}{2}\right]$

(C) $[0, \pi]$ **(D)** $(0,\pi)-\left\{\frac{\pi}{2}\right\}$

Ans. Option (C) is correct.

Explanation: As we know that the principal value of $\cos^{-1}x$ is $[0, \pi]$.

$$y = \cos^{-1}x$$

Q. 4. Which of the following is the principal value branch of $\text{cosec}^{-1}x$?

(A) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ **(B)** $[0,\pi]-\left\{\frac{\pi}{2}\right\}$

(C) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ **(D)** $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]-\{0\}$

Ans. Option (D) is correct.

Explanation : As we know that the principal value of $\text{cosec}^{-1}x$ is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]-\{0\}$.

$$y = \text{cosec}^{-1}x$$

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

(A) $\frac{3\pi}{5}$ **(B)** $\frac{-7\pi}{5}$

(C) $\frac{\pi}{10}$ **(D)** $\frac{-\pi}{10}$

Ans. Option (D) is correct.

Explanation: Let,

$$\sin^{-1}\left[\cos\left(\frac{33\pi}{5}\right)\right] = \sin^{-1}\left[\cos\left(6\pi+\frac{3\pi}{5}\right)\right]$$

$$= \sin^{-1}\left[\cos\left(\frac{3\pi}{5}\right)\right]$$

$$[\because \cos(2n\pi+\theta) = \cos\theta]$$

$$= \sin^{-1}\left[\cos\left(\frac{\pi}{2}+\frac{\pi}{10}\right)\right]$$

$$= \sin^{-1}\left(-\sin\frac{\pi}{10}\right)$$

$$\left[\because \cos\left(\frac{\pi}{2}+x\right) = -\sin x\right]$$

$$= -\sin^{-1}\left(\sin\frac{\pi}{10}\right)$$

$$[\because \sin^{-1}(-x) = -\sin^{-1}x]$$

$$= -\frac{\pi}{10}$$

$$\left[\because \sin^{-1}(\sin x) = x, x \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right)\right]$$

Q. 6. The domain of function $\cos^{-1}(2x-1)$ is

(A) $[0, 1]$ **(B)** $[-1, 1]$

(C) $(-1, 1)$ **(D)** $[0, \pi]$

Ans. Option (A) is correct.

Explanation:

We have $\cos^{-1}(2x-1)$

$\Rightarrow -1 \le 2x-1 \le 1$ $[\because x \in [-1,1]]$

$\Rightarrow 0 \le 2x \le 2$

$\Rightarrow 0 \le x \le 1$

$\Rightarrow \in [0,1]$

Q. 7. The value of $\cos^{-1}\left(\cos\frac{3\pi}{2}\right)$ is

(A) $\frac{\pi}{2}$ **(B)** $\frac{3\pi}{2}$

(C) $\frac{5\pi}{2}$ **(D)** $\frac{7\pi}{2}$

Ans. Option (A) is correct.

Explanation: We have,

$$\cos^{-1}\left(\cos\frac{3\pi}{2}\right) = \cos^{-1}\left[\cos\left(2\pi-\frac{\pi}{2}\right)\right]$$

$$\left[\because \cos\left(2\pi-\frac{\pi}{2}\right) = \cos\frac{\pi}{2}\right]$$

$$= \cos^{-1}\cos\left(\frac{\pi}{2}\right) = \frac{\pi}{2}$$

$$\left[\therefore \cos^{-1}(\cos x) = x, x \in [0,\pi]\right]$$

Q. 8. The value of expression $2\sec^{-1}2 + \sin^{-1}\left(\frac{1}{2}\right)$ is

(A) $\frac{\pi}{6}$ **(B)** $\frac{5\pi}{6}$

(C) $\frac{7\pi}{6}$ **(D)** 1

Ans. Option (B) is correct.

Explanation: We have,

$$2\sec^{-1}2+\sin^{-1}\left(\frac{1}{2}\right)$$

$$=2\sec^{-1}\sec\frac{\pi}{3}+\sin^{-1}\sin\frac{\pi}{6}$$

$$=2\times\frac{\pi}{3}+\frac{\pi}{6}$$

$$\left[\because \sec^{-1}(\sec x)=x \text{ and } \sin^{-1}(\sin x)=x\right]$$

$$=\frac{4\pi+\pi}{6}$$

$$=\frac{5\pi}{6}$$

Q. 9. What is the value of $\sec^2(\tan^{-1}2)$

(A) 1 **(B)** 4

(C) 5 **(D)** 3

Ans. Option (C) is correct.

Explanation :

$$\sec^2(\tan^{-1}2)=\sec^2(\sec^{-1}\sqrt{1+2^2})$$
$$=\sec^2(\sec^{-1}\sqrt{5})$$
$$=(\sqrt{5})^2$$
$$=5$$

Q. 10. The principal value of

$$\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)+4\tan^{-1}\left(\frac{1}{\sqrt{3}}\right) \text{ is}$$

(A) $\frac{\pi}{3}$ **(B)** $\frac{\pi}{6}$

(C) $\frac{4\pi}{3}$ **(D)** $\frac{3\pi}{4}$

Ans. Option (C) is correct.

Explanation :

$$\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)+4\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$$

$$=\cos^{-1}\left(\cos\frac{\pi}{3}\right)+2\sin^{-1}\left(\sin\frac{\pi}{6}\right)+4\tan^{-1}\left(\tan\frac{\pi}{6}\right)$$

$$=\frac{\pi}{3}+2\times\frac{\pi}{6}+4\times\frac{\pi}{6}$$

$$=\frac{2\pi+2\pi+4\pi}{6}$$

$$=\frac{8\pi}{6}$$

$$=\frac{4\pi}{3}$$

Q. 11. The principal value of $\cot^{-1}(-\sqrt{3})$ is

(A) $\frac{5\pi}{6}$ **(B)** $\frac{\pi}{2}$

(C) $\frac{\pi}{4}$ **(D)** $\frac{\pi}{3}$

Ans. Option (A) is correct.

Explanation :

Let $\cot^{-1}(-\sqrt{3}) = \theta$

$\Rightarrow \cot\theta = -\sqrt{3}$

$\Rightarrow \cot\theta = -\cot\frac{\pi}{6}$

$= \cot\left(\pi-\frac{\pi}{6}\right)$

$\Rightarrow \cot\theta = \cot\frac{5\pi}{6}$

$\Rightarrow \theta = \frac{5\pi}{6} \in (0, \pi)$

$\therefore$ Principal value of $\cot^{-1}(-\sqrt{3})$ is $\frac{5\pi}{6}$

Q. 12. Domain of $\sin^{-1}x$ is:

(A) $[-1, \infty)$ **(B)** $[-1, 1]$

(C) $(-1, 1)$ **(D)** None of these.

Ans. Option (B) is correct.

Explanation : Domain of $\sin^{-1}x$ is $[-1, 1]$

Q. 13. Range of $\cos^{-1}x$ is:

(A) $\left[0, \frac{\pi}{2}\right]$ **(B)** $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(C) $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ **(D)** $[0, \pi]$

Ans. Option (D) is correct.

Explanation : The branch with range $[0, \pi)$ is called the principal value branch of the function $\cos^{-1}x$.

Q. 14. Domain of $\sec^{-1}x$ is:

(A) $R - (-1, 1)$ **(B)** R

(C) $[-1, 1]$ **(D)** $R - (0, 1)$

Ans. Option (A) is correct.

Q. 15. The value of $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$ is:

(A) π **(B)** $-\frac{\pi}{3}$

(C) $\frac{\pi}{3}$ **(D)** $\frac{2\pi}{3}$

Ans. Option (B) is correct.

Explanation : $\tan^{-1}(\sqrt{3}) - \sec^{-1}(-2)$

$= \frac{\pi}{3} - \frac{2\pi}{3}$

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

ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false and R is True

Q. 1. Assertion (A): $\sin^{-1}\left(\sin\frac{2\pi}{3}\right)=\frac{2\pi}{3}$

Reason (R): $\sin^{-1}(\sin\theta)=\theta$, if $\theta\in\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$

Ans. Option (D) is correct.

Explanation:

The principal value branch of $\sin^{-1}x$ is $\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$

Let $x=\sin\theta\Rightarrow\theta=\sin^{-1}x$

$\sin^{-1}(\sin\theta)=\sin^{-1}x=\theta$

$\sin^{-1}(\sin\theta)=\theta$, if $\theta\in\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$.

Hence R is true.

$\sin^{-1}\left(\sin\frac{2\pi}{3}\right)\neq\frac{2\pi}{3}$, since $\frac{2\pi}{3}\notin\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$

Hence A is false.

Q. 2. Assertion (A): Range of $\tan^{-1}x$ is $\left(\frac{-\pi}{2},\frac{\pi}{2}\right)$

Reason (R): Domain of $\tan^{-1}x$ is R.

Ans. Option (B) is correct.

Explanation: Domain of tan x is the set $\{x : x\in R$ and $x\neq(2n+1)\frac{\pi}{2}, n\in Z\}$ and Range is R.

$\Rightarrow$ tan x is not defined for odd multiples of $\frac{\pi}{2}$.

If we restrict the domain of tangent function to $\left(\frac{-\pi}{2},\frac{\pi}{2}\right)$, then it is one-one and onto with its range as R. Actually tan x restricted to any of the intervals $\left(\frac{-3\pi}{2},\frac{-\pi}{2}\right),\left(\frac{-\pi}{2},\frac{\pi}{2}\right),\left(\frac{\pi}{2},\frac{3\pi}{2}\right)$ etc., is bijective and its range is R.

Thus $\tan^{-1}x$ can be defined as a function whose domain is R and range could be any of the intervals $\left(\frac{-3\pi}{2},\frac{-\pi}{2}\right),\left(\frac{-\pi}{2},\frac{\pi}{2}\right),\left(\frac{\pi}{2},\frac{3\pi}{2}\right)$ and soon.

$\therefore$ Both A and R are true but R is not correct explanation of A.

Q. 3. Assertion (A): Principal value of $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is $\frac{\pi}{4}$

Reason (R): Principal value of $\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)$ is $\frac{\pi}{3}$

Ans. Option (C) is correct.

Explanation:

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)=\sin^{-1}\left(\sin\frac{\pi}{4}\right)$$

$$=\frac{\pi}{4}$$

$$\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)=y$$

$$\cot y=\frac{-1}{\sqrt{3}}$$

$$=-\cot\left(\frac{\pi}{3}\right)$$

$$=\cot\left(\pi-\frac{\pi}{3}\right)$$

$$=\cot\left(\frac{2\pi}{3}\right)$$

$$\Rightarrow\quad\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)=\frac{2\pi}{3}$$

Hence Assertion is correct and Reason is incorrect.

Q. 4. Assertion (A): Range of $\cot^{-1}x$ is $(0,\pi)$

Reason (R): Domain of $\tan^{-1}x$ is R.

Ans. Option (B) is correct.

Q. 5. Assertion (A): Principal value of $\cos^{-1}(1)$ is π

Reason (R): Value of cos $0°$ is 1

Ans. Option (D) is correct.

Explanation: In case of Assertion:

$$\cos^{-1}(1)=y$$

$$\cos y=1$$

$$\cos y=\cos 0°\qquad[\because\cos 0°=1]$$

$$\therefore\quad y=0$$

$\Rightarrow$ Principal value of $\cos^{-1}(1)$ is 0

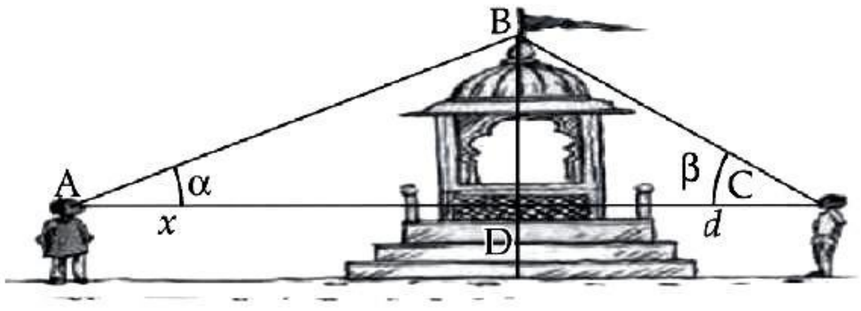
Hence Assertion is in correct.

Reason is correct.

CASE-BASED MCQs

Attempt any four sub-parts from each question. Each sub-part carries 1 mark.

I. Read the following text and answer the following questions on the basis of the same:



Two men on either side of a temple of 30 metres high observe its top at the angles of elevation α and β respectively. (as shown in the figure above). The distance between the two men is $40\sqrt{3}$ metres and the distance between the first person A and the temple is $30\sqrt{3}$ meters. **[CBSE QB-2021]**

Q. 1. $\angle CAB = \alpha =$

(A) $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ **(B)** $\sin^{-1}\left(\frac{1}{2}\right)$

(C) $\sin^{-1}(2)$ **(D)** $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Ans. Option (B) is correct.

Explanation: In Δ BDA

$$\sin\alpha = \frac{BD}{AB}$$

$$AB^2 = AD^2 + BD^2$$
$$= (30\sqrt{3})^2 + (30)^2$$
$$= (60)^2$$
$$AB = 60\,\text{m}$$

Now, $\sin\alpha = \frac{30}{60}$

$$\sin\alpha = \frac{1}{2}$$

i.e. $\angle \text{CAB} = \alpha = \sin^{-1}\left(\frac{1}{2}\right)$

Q. 2. $\angle CAB = \alpha =$

(A) $\cos^{-1}\left(\frac{1}{5}\right)$ **(B)** $\cos^{-1}\left(\frac{2}{5}\right)$

(C) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ **(D)** $\cos^{-1}\left(\frac{4}{5}\right)$

Ans. Option (C) is correct.

Explanation: In Δ *BDA*

$$\cos\alpha = \frac{AD}{AB}$$

$$\cos\alpha = \frac{30\sqrt{3}}{60}$$

$$\alpha = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$$

$\therefore$ $\angle CAB = \alpha = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Q. 3. $\angle BCA = \beta =$

(A) $\tan^{-1}\left(\frac{1}{2}\right)$ **(B)** $\tan^{-1}(2)$

(C) $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ **(D)** $\tan^{-1}\left(\sqrt{3}\right)$

Ans. Option (D) is correct.

Explanation:

$$DC = AC - AD$$
$$= 40\sqrt{3} - 30\sqrt{3}$$
$$= 10\sqrt{3}\,\text{m}$$

In Δ*BDC*

$$\tan\beta = \frac{BD}{DC} = \frac{30}{10\sqrt{3}} = \sqrt{3}$$

$$\angle BCA = \beta = \tan^{-1}(\sqrt{3})$$

Q. 4. $\angle ABC =$

(A) $\frac{\pi}{4}$ **(B)** $\frac{\pi}{6}$

(C) $\frac{\pi}{2}$ **(D)** $\frac{\pi}{3}$

Ans. Option (C) is correct.

Explanation: Since,

$$\sin\alpha = \frac{1}{2}$$

i.e., $\sin\alpha = \sin 30°$

$$\left[\because \sin 30° = \frac{1}{2}\right]$$

$\therefore$ $\alpha = 30°$

we, have $\tan\beta = \sqrt{3}$

$$\tan\beta = \tan 60°$$

$\therefore$ $\beta = 60°$

Now, In Δ*ABC*

$$\angle ABC + \angle BCA + \angle CAB = 180°$$
$$\angle ABC + 60° + 30° = 180°$$
$$\angle ABC = 90°$$

$\therefore$ $\angle ABC = \frac{\pi}{2}$

Q. 5. Domain and Range of $\cos^{-1} x =$

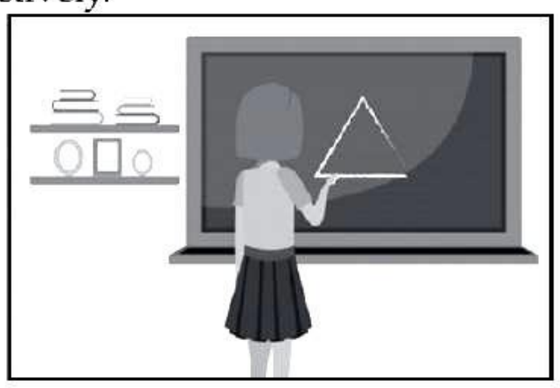
(A) $(-1, 1), (0, \pi)$ **(B)** $[-1, 1], (0, \pi)$

(C) $[-1, 1], [0, \pi]$ **(D)** $(-1, 1), \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Ans. Option (C) is correct.

II. Read the following text and answer the following questions on the basis of the same:

In the school project Sheetal was asked to construct a triangle and name it as ABC. Two angles A and B were given to be equal to $\tan^{-1}\frac{1}{2}$ and $\tan^{-1}\frac{1}{3}$ respectively.



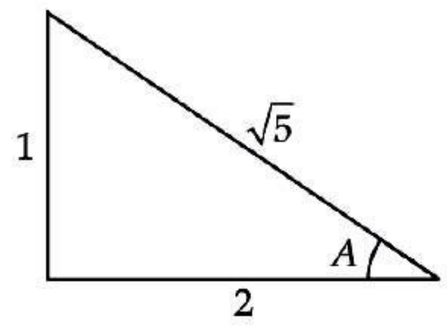
Q. 1. The value of $\sin A$ is _____.

(A) $\frac{1}{2}$ **(B)** $\frac{1}{3}$

(C) $\frac{1}{\sqrt{5}}$ **(D)** $\frac{2}{\sqrt{5}}$

Ans. Option (C) is correct.

Explanation:



$$A = \tan^{-1}\frac{1}{2}$$

$$\Rightarrow \tan A = \frac{1}{2}$$

$$\therefore \sin A = \frac{1}{\sqrt{5}}$$

Q. 2. $\cos(A + B + C) =$ _____.

(A) 1 **(B)** 0

(C) –1 **(D)** $\frac{1}{2}$

Ans. Option (C) is correct.

Explanation: Since ABC is a triangle,

$$\therefore A + B + C = 180°$$

$$\cos(A + B + C) = \cos 180°$$

$$= -1$$

Q. 3. If $B - \cos^{-1} x$, then $x -$ _____.

(A) $\frac{1}{\sqrt{5}}$ **(B)** $\frac{3}{\sqrt{10}}$

(C) $\frac{1}{\sqrt{10}}$ **(D)** $\frac{2}{\sqrt{5}}$

Ans. Option (B) is correct.

Explanation:

Given $B = \tan^{-1}\frac{1}{3}$

$$\Rightarrow \tan B = \frac{1}{3}$$

$$\therefore \cos B = \frac{3}{\sqrt{10}}$$

$$B = \cos^{-1}\frac{3}{\sqrt{10}}$$

$$\Rightarrow x = \frac{3}{\sqrt{10}}$$

Q. 4. If $A = \sin^{-1}x$; then the value of x is:

(A) $\frac{1}{\sqrt{5}}$ **(B)** $\frac{2}{\sqrt{5}}$

(C) $\frac{1}{\sqrt{10}}$ **(D)** $\frac{3}{\sqrt{10}}$

Ans. Option (A) is correct.

Explanation:

$$A = \tan^{-1}\frac{1}{2}$$

$$\Rightarrow \tan A = \frac{1}{2}$$

$$\therefore \sin A = \frac{1}{\sqrt{5}}$$

$$A = \sin^{-1}\left(\frac{1}{\sqrt{5}}\right)$$

$$\Rightarrow x = \frac{1}{\sqrt{5}}$$

Q. 5. The third angle, $\angle C =$ _____.

(A) $\frac{\pi}{4}$ **(B)** $\frac{\pi}{2}$

(C) $\frac{\pi}{3}$ **(D)** $\frac{3\pi}{4}$

Ans. Option (D) is correct.

Explanation:

$$\angle C = \pi - (A + B)$$

$$= \pi - \frac{\pi}{4}$$

$$= \frac{3\pi}{4}$$

III. Read the following text and answer the following questions on the basis of the same:

The value of an inverse trigonometric functions which lies in the range of Principal branch is called the principal value of that inverse trigonometric functions.

Q. 1. Principal value of $\sin^{-1}\left(\frac{1}{2}\right)$ is

(A) $\frac{\pi}{6}$ **(B)** $\frac{\pi}{3}$

(C) $\frac{\pi}{4}$ **(D)** $\frac{\pi}{2}$

Ans. Option (A) is correct.

Explanation:

$$\sin^{-1}\left(\frac{1}{2}\right) = y$$

$$\sin y = \frac{1}{2}$$

Principal value branch of $\sin^{-1}$ is $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

and $\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

$\Rightarrow$ Principal vlaue of $\sin^{-1}\left(\frac{1}{2}\right)$ is $\frac{\pi}{6}$

Q. 2. Principal value of $\tan^{-1}(1)$

(A) $\frac{\pi}{4}$ **(B)** $\frac{\pi}{2}$

(C) π **(D)** $\frac{\pi}{3}$

Ans. Option (A) is correct.

Explanation:

$$\tan^{-1}(1) = \tan^{-1}\left(\tan\frac{\pi}{4}\right)$$

$$= \frac{\pi}{4}$$

Q. 1. Principal value of $\cot^{-1}(\sqrt{3})$ is :

(A) $\frac{\pi}{3}$ **(B)** π

(C) $\frac{\pi}{6}$ **(D)** $\frac{\pi}{2}$

Ans. Option (C) is correct.

Explanation:

$$\cot^{-1}(\sqrt{3}) = \cot^{-1}\left(\cot\frac{\pi}{6}\right)$$

$$= \frac{\pi}{6}$$

Q. 4. Principal value of $\sin^{-1}(1) + \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is

(A) 2π **(B)** π

(C) $\frac{3\pi}{4}$ **(D)** $\frac{\pi}{3}$

Ans. Option (C) is correct.

Explanation:

$$\sin^{-1}(1) + \sin^{-1}\left(\frac{1}{\sqrt{2}}\right) = \frac{\pi}{2} + \frac{\pi}{4}$$

$$= \frac{3\pi}{4}$$

Q. 5. Principal value of $2\cos^{-1}(1) + 5\tan^{-1}(1)$ is:

(A) $\frac{3\pi}{4}$ **(B)** $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$ **(D)** $\frac{5\pi}{4}$

Ans. Option (D) is correct.

Explanation:

$$2\cos^{-1}(1) + 5\tan^{-1}(1)$$

$$= 2 \times 0 + 5 \times \frac{\pi}{4}$$

$$= \frac{5\pi}{4}$$