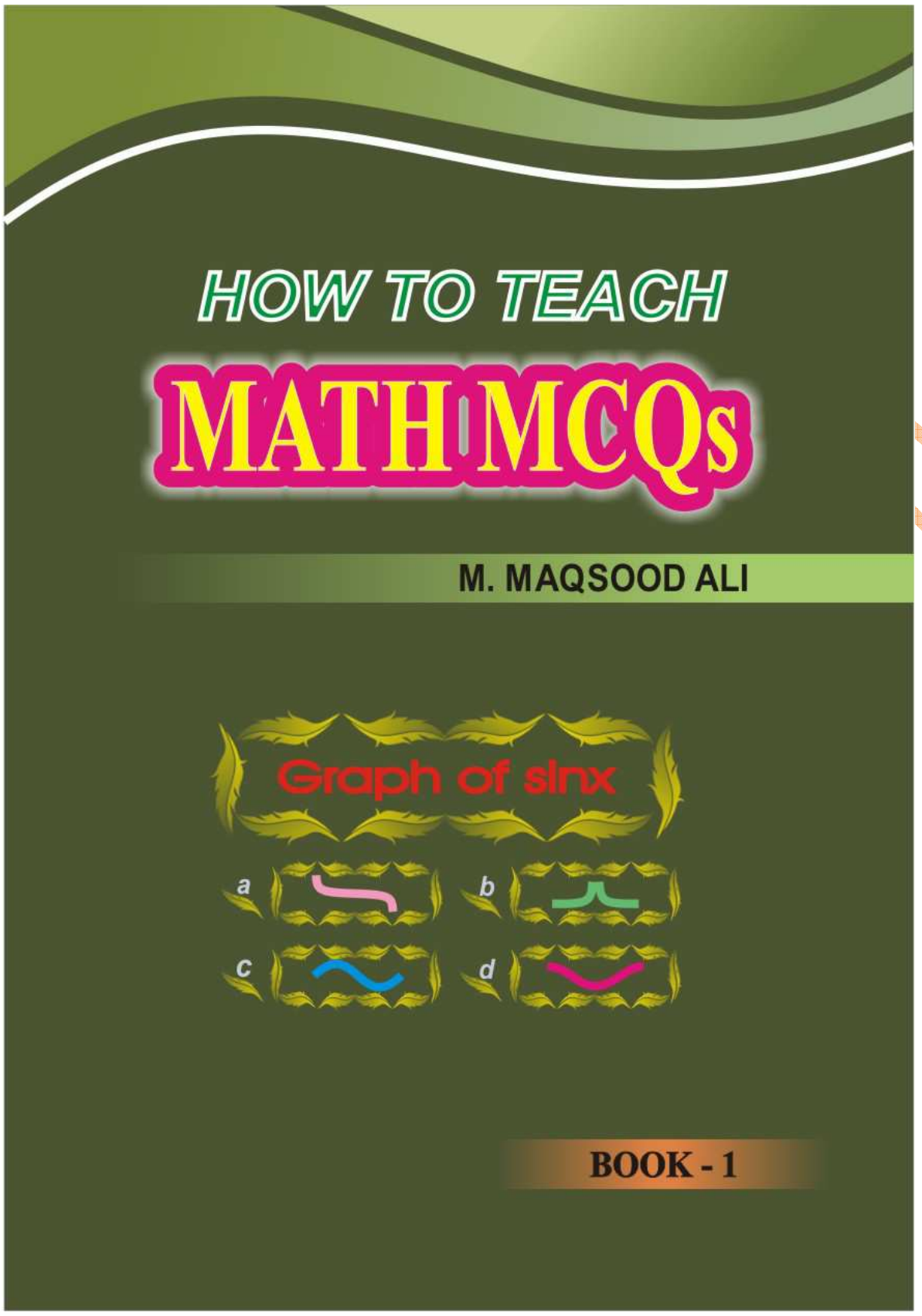

HOW TO TEACH
MATH MCQs
M. MAQSOOD ALI
Graph of sinx
a
b
c
d
BOOK - 1

Chapter 17

INVERSE TRIGONOMETRIC FUNCTIONS

DOMAIN AND RANGE

S. No.	Function	Domain	Range
1	$sin^{-1}x$	$[-1\,,1]$	$[-\pi/2\,,\pi/2]$
2	$cos^{-1}x$	$[-1\,,1]$	$[0\,,\pi]$
3	$tan^{-1}x$	$(-\infty\,,+\infty)$ or $\mathbb{R}$	$(-\pi/2\,,\pi/2)$
4	$cosec^{-1}x$	$(-\infty\,,-1]\cup[1\,,+\infty)$	$[-\pi/2\,,\pi/2]-\{0\}$
5	$sec^{-1}x$	$(-\infty\,,-1]\cup[1\,,+\infty)$	$[0\,,\pi]-\{\pi/2\}$
6	$cot^{-1}x$	$(-\infty\,,+\infty)$ or $\mathbb{R}$	$(0\,,\pi)$

EXERCISE-1

(1) $f(x)=\sin^{-1}x$. What is the domain of f?

(a) $-1<x<1$ (b) $|x|<1$ (c) $|x|\leq 1$ (d) $-\frac{\pi}{2}\leq x\leq\frac{\pi}{2}$

(2) $f(x)=\cos^{-1}x$. What is the range of f ?

(a) $-\pi\leq x\leq\pi$ (b) $-1\leq x\leq 1$ (c) $0\leq x\leq 2\pi$ (d) $0\leq x\leq\pi$

(3) $f(x)=\tan^{-1}x$. What is the range of f ?

(a) $0\leq x<\frac{\pi}{2}$ (b) $-\frac{\pi}{2}<x<\frac{\pi}{2}$ (c) $-\infty<x<\infty$ (d) $0<x<2\pi$

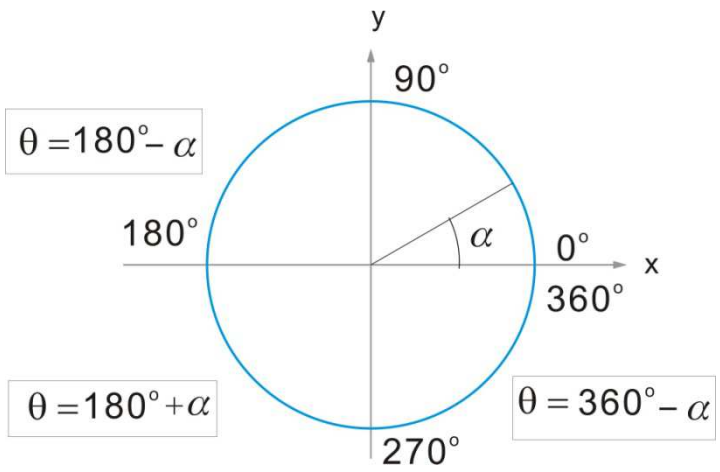
(4) $f(x)=\sin^{-1}x$. What is the range of f ?

(a) $0\leq x<2\pi$ (b) $-1<x<1$ (c) $0\leq x\leq\pi$ (d) $-\frac{\pi}{2}\leq x\leq\frac{\pi}{2}$

(5) $f(x)=\sec^{-1}x$. What is the domain of f ?

(a) $(-\infty,\infty)$ (b) $(-\infty,-]\cup[1,\infty)$ (c) $[-1,1]$ (d) $(-\infty,0)\cup(0,\infty)$

SHIFTING THE BASIC ANGLE α TO 2^{nd} , 3^{rd} AND 4^{th} QUADRANT



CALCULATION FOR ANGLES

If p is a non –negative real number, θ is any angle and ∝ is the basic angle (in first quadrant) .

i) $sin\theta = \pm p$

$sin\theta = p$	$sin\theta = -p$
θ is in the 1^{st} or 2^{nd} quadrant. $\alpha = \sin^{-1} p$ $\theta = \alpha \ , \ 180^o - \alpha$	θ is in the 3^{rd} or 4^{th} quadrant. $\alpha = \sin^{-1} p$ $\theta = 180^o + \alpha \ , \ 360^o - \alpha$

ii) $cos\theta \ = \pm p$

$cos\theta = p$	$\cos\theta = -p$
θ is in the 1^{st} or 4^{th} quadrant. $\alpha = \cos^{-1} p$ $\theta = \ \alpha \ , 360^0 - \alpha$	θ is in the 2^{nd} or 3^{rd} quadrant. $\alpha = \cos^{-1} p$ $\theta = 180^0 - \alpha, 180^0 + \alpha$

iii) $tan\theta = \pm p$

$tan\ \theta = p$	$tan\ \theta = -p$
θ is in the 1^{st} or 3^{rd} quadrant. $\alpha = \tan^{-1} p$ $\theta = \alpha \ , \ 180^0 + \alpha$	θ is in the 2^{nd} or 4^{th} quadrant: $\alpha = \tan^{-1} p$ $\theta = 180^0 - \alpha \ , \ 360^0 - \alpha$

AUTHOR

M. MAQSOOD ALI

ASSISTANT PROFESSOR OF MATHEMATICS

METHOD-2 (PARTICULARLY FOR CLASS XI):

The period of $\sin\theta$ and $\cos\theta$ is 2π and $\tan\theta$ is π.

$sin\theta = p > 0$	$cos\theta = p > 0$	
$\theta = \sin^{-1}p\ , \pi - sin^{-1}p$ and than add $2n\pi$, $n\in\mathbb{Z}$	$\theta = \pm\, cos^{-1}\, p$ and than add 2π, $n\in\mathbb{Z}$	

$tan\theta = p > 0$	$tan\theta = -p < 0$
$\theta = \tan^{-1}p$ Calculate only one angle and then add $n\pi$, $n\in\mathbb{Z}$.	$\theta = \tan^{-1}(-p)$ Calculate only one angle and then add $n\pi$, $n\in\mathbb{Z}$.

Examples:

i) $sin\theta = 0.5$

$$\theta = sin^{-1}0.5 = \frac{\pi}{6}, \pi - \frac{\pi}{6}$$

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

Solution set : $\left\{\frac{\pi}{6} + 2n\pi\right\} U \left\{\frac{5\pi}{6} + 2n\pi\right\}$; $n \in \mathbb{Z}$

ii) $cos\theta = 0.5$

$$\theta = cos^{-1}0.5 = \pm\frac{\pi}{3}$$

Solution set : $\left\{\pm\frac{\pi}{3} + 2n\pi\right\}$; $n \in \mathbb{Z}$

iii) $tan\theta = 1$

$$\theta = tan^{-1}1 = \frac{\pi}{4}$$

Solution set: $\{\frac{\pi}{4} + n\pi\}$; $n \in \mathbb{Z}$

iv) $\tan\theta = -1$

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

Solution set: $\{-\frac{\pi}{4} + n\pi\}$; $n \in \mathbb{Z}$

MCQ- 3:

θ =? , if $sin\ (^{3\theta}/_{2}) = 0$, where $0^o \leq \theta \leq 360^o$

(a) 0^0 ,120^0 , 180^0 (b) 0^0 , 180^0, 300^0

(c) 0^0 , 180^0 , 360^0 (d) 0^0 , 120^0 , 240^0

Solution:

$$\frac{3\theta}{2} = \sin^{-1} 0$$
$$= 0^0\ , 180^0 - 0^0$$
$$= 0^0\ ,\ 180^0$$

Since θ is multiplying by 3, so write another angle by adding 360^0 in first value that is 0^0.

$$\frac{3\theta}{2} = 0^0, 180^0, 360^0 + 0^0$$
$$\frac{3\theta}{2} = 0^0, 180^0, 360^0$$
$$\theta = 0^0, 120^0, 240^0$$

All the above angles lie between $0^0 - 360^0$.

The answer is (d).

EXERCISE-2

(1) $\sin^{-1}\frac{1}{2} + tan^{-1}1 = ?$

(a) 75^0 (b) 105^0 (c) 120^0 (d) 90^0

(2) $\sin^{-1}\frac{1}{\sqrt{2}} + cos^{-1}\frac{\sqrt{3}}{2} = ?$

(a) 120^0 $(b)\ 105^0$ (c) 75^0 (d) 45^0

(3) $sec^{-1}2 + cot^{-1}1 = ?$

(a) 75^0 (b) 105^0 (c) 85^0 (d) 60^0

(4) $cosec^{-1}2 + sec^{-1}\frac{2}{\sqrt{3}} = ?$

(a) 120^0 (b) 105^0 (c) 90^0 (d) 60^0

(5) 3 $\text{cose}c^{-1}2 - 2sec^{-1}\sqrt{2}$ = ?

(a) 0^0 (b) 60^0 (c) 30^0 (d) 90^0

(6) cos $\{5\ \text{sec}^{-1}\frac{2}{\sqrt{3}} - 2\ cosec^{-1}\frac{2}{\sqrt{3}}\} = ?$

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

(7) sin (2 $\text{sec}^{-1}2 - 2\ cot^{-1}1$) = ?

(a) 0 (b) $\frac{1}{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

(8) cos (3 $\text{cos}^{-1}\frac{1}{2} - 3\ sin^{-1}\frac{1}{2}$) = ?

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) 1 (d) 0

(9) What is the value of x if sin $\frac{x}{2} = \frac{1}{2}$?

(a) 30^0 (b) 300^0 (c) 240^0 (d) 370^0

(10) Given that tan $\frac{x}{2} = 1$. What is the value of x ?

(a) 380^0 (b) 710^0 (c) 810^0 (d) 150^0

(11) Given that: $2cos2x = 1$. What is the value of x?

(a) 720^0 (b) 420^0 (c) 120^0 (d) 330^0

(12) Given that $\text{sin}^{-1}\frac{\sqrt{3}}{2} = 60^0$.

What is the value of x *if* $2sin2x = -\sqrt{3}$?

(a) 510^0 (b) 240^0 (c) 315^0 (d) 210^0

(13) Given that $\text{sin}^{-1}0.5 = 30^0$.

What is the value of x *is* $2\ sin5x + 1 = 0$?

(a) 108^0 (b) 138^0 (c) 240^0 (d) 300^0

(14) Given that $\text{cos}^{-1}\frac{1}{\sqrt{2}} = 45^0$.

What is the value of x *if* $2\ cos^2\frac{x}{2} - 1 = 0$?

(a) 45^0 (b) 450^0 (c) 135^0 (d) 225^0

SIMPLE AND INVERSE TRIGONOMETRIC FUNCTIONS

Formulae:

(i) $\theta = cosec^{-1}x \Rightarrow \theta = sin^{-1}\frac{1}{x}$

(ii) $\theta = sec^{-1}x \Rightarrow \theta = cos^{-1}\frac{1}{x}$

(iii) $\theta = cot^{-1}x \Rightarrow \theta = tan^{-1}\frac{1}{x}$

Shortcuts For $\sin\left(cos^{-1}\frac{-\sqrt{3}}{2}\right)$, $\tan\left(tan^{-1}\sqrt{3}\right)$, $\cot\left(tan^{-1}\sqrt{3}\right)$ etc:

For the MCQs like $x = g(f^{-1}a) =?$

where f and g are trigonometric functions.

Case-1: g and f are not same:

i) Find basic angle α.

ii) $x = \pm g(\alpha)$

Case-2: g and f are same :

$x = a$

Case-3: g is reciprocal of f:

$x = {}^{1}/_{a}$

MCQ- 4:

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

(a) $-\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{\sqrt{2}}$ (d) None

Solution: (Long Method)

$$\theta = cos^{-1}\frac{-\sqrt{3}}{2}$$

Basic angle α

$$\alpha = cos^{-1}\frac{\sqrt{3}}{2}$$

AUTHOR

M. MAQSOOD ALI

ASSISTANT PROFESSOR OF MATHEMATICS

$$\pm tan\alpha = \pm tan45^o$$
$$= \pm 1$$

The answer is (b).

MCQ-6 :

$\tan\left(tan^{-1}\sqrt{3}\right) =?$

(a) $-\sqrt{3}$ (b) -1 (c) $-\frac{1}{\sqrt{3}}$ (d) None

Solution:

$$\tan\left(tan^{-1}\sqrt{3}\right)$$
$$= \sqrt{3}$$

The answer is (d).

MCQ- 7:

$\cot\left(tan^{-1}\sqrt{3}\right) =?$

(a) $-\sqrt{3}$ (b) -1 (c) $-\frac{1}{\sqrt{3}}$ (d) None

Solution:

$cot\theta$ is reciprocal of $tan\theta$.

$$\cot\left(tan^{-1}\sqrt{3}\right)$$
$$= {}^{1}/_{\tan\left(tan^{-1}\sqrt{3}\right)}$$
$$= {}^{1}/_{\sqrt{3}}$$

The answer is (d).

MCQ- 8:

$sin\left(cosec^{-1}\sqrt{2}\right) =?$

(a) ${}^{1}/_{2}$ (b) ${}^{\sqrt{3}}/_{2}$ (c) ${}^{1}/_{\sqrt{2}}$ (d) None

Solution:

$$\sin\left(cosec^{-1}\sqrt{2}\right)$$

$$= sin\,(sin^{-1}\,{}^{1}/_{\sqrt{2}})$$

Note: $\theta = cosec^{-1}\sqrt{2}$

$cosec\theta = \sqrt{2}$

$\frac{1}{sin\theta} = \sqrt{2}$

$sin\theta = {}^{1}/_{\sqrt{2}}$

$\theta = sin^{-1}\,{}^{1}/_{\sqrt{2}}$

$$= {}^{1}/_{\sqrt{2}}$$

The answer is (c).

EXERCISE-3

(1) $tan(\sin^{-1} 0.5) = ?$

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

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

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

(3) $sec(\cos^{-1}0.5) = ?$

(a) 2 (b) ${}^{1}/_{2}$ (c) $\frac{\sqrt{3}}{2}$ (d) ${}^{1}/_{\sqrt{2}}$

(4) $tan\left(\cot^{-1}\sqrt{3}\right) = ?$

(a) 1 (b) ${}^{1}/_{\sqrt{2}}$ (c) ${}^{1}/_{\sqrt{3}}$ (d) $\sqrt{3}$

SOLUTION OF EQUATIONS

Mostly MCQs "SOLUTION OF EQUATIONS" depends on that do you know the values of $sin\theta$, $cos\theta$ and $tan\theta$ at $\theta = 0, {}^{\pi}/_{6}, {}^{\pi}/_{4}, {}^{\pi}/_{3}, {}^{\pi}/_{2}, \pi, 2\pi$.

MCQ-9 :

$x =?$, if $sinx + cosx = -1$

(a) 0 (b) 2π (c) ${}^{\pi}/_{2}$ (d) π

Solution:

Do not solve the equation.
Check four given option one by one.
Option (d): $x = \pi$

$$sin\pi + cos\pi$$
$$= 0 + (-1)$$
$$= -1$$

The answer is (d).

MCQ- 10:

$x =?$, if $cos^2x + tanx = {}^{3}/_{2}$

(a) 2π (b) ${}^{\pi}/_{4}$ (c) ${}^{\pi}/_{2}$ (d) ${}^{\pi}/_{6}$

Solution:

Do not solve the equation.
Check four given option one by one.
Option (a): $x = 2\pi$

$$cos^2 2\pi + tan2\pi$$
$$= 1 + 0$$
$$= 1 \neq {}^{3}/_{2}$$

Option (d): $x = {}^{\pi}/_{4}$

$$cos^2 {}^{\pi}/_{4} + tan {}^{\pi}/_{4}$$
$$= \frac{1}{2} + 1$$

$$= {}^{3}/_{2}$$

The answer is (b).

EXERCISE-4

(1) $sinx - cosx = 0$ then $x = ?$

(a) 0^0 (b) 30^0 (c) 45^0 (d) 90^0

(2) $\sqrt{2}\, cosecx - tanx = 1. What\ is\ the\ value\ of\ x?$

(a) 60^0 (b) 0^0 (c) 30^0 (d) 45^0

(3) $\sec^2 x - cosec^2 x = 0$

(a) 90^0 (b) 0^0 (c) 30^0 (d) 45^0

AUTHOR

M. MAQSOOD ALI

ASSISTANT PROFESSOR OF MATHEMATICS

FREE DOWNLOAD

ALL BOOKS AND CD ON MATHEMATICS

BY

M. MAQSOOD ALI

FROM WEBSITE

www.mathbunch.com