# CHAPTER 14 SOLUTION OF TRIGONOMETRIC EQUATIONS

## PRACTICE EXERCISE

1) The most general value of θ which will satisfy both the equations $\sin\theta = -\frac{1}{2}$ and $\tan\theta = \frac{1}{\sqrt{3}}$ is

(a) $n\pi + \frac{\pi}{6}$

(b) $2n\pi + \frac{7\pi}{6}$

(c) $2n\pi + \frac{11\pi}{6}$

(d) $n\pi + (-1)^n \frac{7\pi}{6}$

2) $\tan(\cot^{-1} x) =$

(a) $\frac{\pi}{2} - x$

(b) $\cot(\tan^{-1} x)$

(c) $\tan x$

(d) none

3) The value of $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right)$ is

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{6}$

(c) $\frac{\pi}{3}$

(d) 0

4) $\sin\left[\cos^{-1}\left(-\frac{1}{2}\right)\right]$ is

(a) $\frac{1}{\sqrt{2}}$

(b) 1

(c) $\frac{\sqrt{3}}{2}$

(d) none

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

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{6}$

(c) $\frac{\pi}{3}$

(d) $\frac{2\pi}{3}$



6) $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) =$

(a) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$

(b) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$

(c) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$

(d) $\tan^{-1}\left(\frac{1}{2}\right)$

7) The principle value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ is

(a) $-\frac{2\pi}{3}$

(b) $-\frac{\pi}{3}$

(c) $\frac{4\pi}{3}$

(d) $\frac{5\pi}{3}$

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

(a) $\frac{3}{5}$

(b) $\frac{4}{5}$

(c) $\frac{1}{5}$

(d) none

9) If $\sin^{-1} x = \frac{4}{5}$ for some $x \in [-1,1]$, then the value of $\cos^{-1} x$ is

(a) $\frac{5\pi-8}{2}$

(b) $\frac{\pi-8}{10}$

(c) $\frac{5\pi-2}{10}$

(d) $\frac{5\pi-8}{10}$

10) Number of solutions of the equation $\tan x + \sec x = 2\cos x$ lying in the interval $[0, 2\pi]$ is

(a) 0

(b) 1

(c) 2

(d) 3

11) The general solution of $\tan x = \sin x$ is

(a) $n\pi$

(b) $2n\pi$

(c) $\frac{n\pi}{2}$

(d) none

12) The quadratic equation $8\sec^2\theta - 6\sec\theta + 1 = 0$ has
(a) Exactly two roots
(b) Exactly four roots
(c) Infinitely many roots
(d) No roots

13) The smallest positive angle satisfying the equation $\sin^2\theta - 2\cos\theta + \frac{1}{4} = 0$ is
(a) $\frac{\pi}{2}$
(b) $\frac{\pi}{3}$
(c) $\frac{\pi}{4}$
(d) $\frac{\pi}{6}$

14) If $\sin\theta = k$ and k is any integer then for exactly one value of $\theta$, $\theta \in \left[0, \frac{\pi}{3}\right]$, then the value of k is
(a) 1
(b) $-1$
(c) $\frac{1}{\sqrt{2}}$
(d) 0

15) The value of $\theta$ satisfying $\cos\theta + \sqrt{3}\sin\theta = 2$ is
(a) $\frac{5\pi}{3}$
(b) $\frac{4\pi}{3}$
(c) $\frac{2\pi}{3}$
(d) $\frac{\pi}{3}$

16) $\cot\theta = \sin 2\theta$ where $(\theta \neq n\pi, n$ integer), if $\theta$ equals
(a) 45° and 90°
(b) 45° and 60°
(c) 90° only
(d) 45° only

17) If $4\sin^2\theta = 1$, then the values of $\theta$ are
(a) $2n\pi \pm \frac{\pi}{3}$
(b) $n\pi \pm \frac{\pi}{3}$
(c) $n\pi \pm \frac{\pi}{6}$
(d) $2n\pi \pm \frac{\pi}{6}$

18) The smallest positive angle which satisfies the equation $2\sin^2\theta + \sqrt{3}\cos\theta + 1 = 0$ is
(a) $\frac{5\pi}{6}$
(b) $\frac{2\pi}{3}$



(c) $\frac{\pi}{3}$
(d) $\frac{\pi}{6}$

19) The solution of the equation $\cos^2\theta + \sin\theta + 1 = 0$ lies in the interval
(a) $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$
(b) $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$
(c) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$
(d) none

20) If $\sin\theta + \cos\theta = \sqrt{2}$ and $\theta$ is acute, then $\theta$ is
(a) $\frac{\pi}{4}$
(b) $\frac{\pi}{2}$
(c) $\frac{\pi}{3}$
(d) none

21) The value of $\theta$ lying between $0°$ *and* $360°$ and satisfying the equation $\tan\theta + \sqrt{3}$ is
(a) 330°
(b) 300°
(c) 135°
(d) 225°

22) Which of the following is a solution of $\cos 3x = \frac{1}{2}$?
(a) $60^0$
(b) $\frac{5\pi}{3}$
(c) $\arccos\left(\frac{1}{6}\right)$
(d) $\frac{1}{3}\arccos\left(\frac{1}{2}\right)$

23) $\sin^{-1}x + \cos^{-1}x = ?$
(a) 0
(b) $\pi$
(c) $\frac{\pi}{2}$
(d) $\frac{\pi}{3}$

24) Range of $\tan^{-1}x$ is
(a) R
(b) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
(c) $[0, \pi]$
(d) None




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25) Range of $cosec^{-1}x$ is

(a) $(0, \pi)$

(b) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

(c) $[0, \pi]$

(d) None

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

(a) $-\frac{\pi}{4}$

(b) $-\frac{\pi}{3}$

(c) $-\frac{\pi}{2}$

(d) $-\frac{\pi}{4}$

27) Which of the following can be the solution of $sin2x - cosx = 0$?

(a) $\left\{\frac{\pi}{4}, \frac{3\pi}{4}\right\}$

(b) $\left\{\frac{\pi}{3}, \frac{\pi}{4}\right\}$

(c) $\left\{\frac{2\pi}{3}, \frac{3\pi}{4}\right\}$

(d) $\left\{\frac{\pi}{2}, \frac{\pi}{6}\right\}$

28) Solve for $xcosx = 0$

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{3}$

(c) $\frac{5\pi}{6}$

(d) $\frac{\pi}{4}$

29) $sin^{-1}x$ ?

(a) $Cos^{-1}x$

(b) $Cos^{-1}\frac{1}{x}$

(c) $-sin^{-1}x$

(d) $\pi - cos^{-1}x$

30) $cot^{-1}x = ?$

(a) $\frac{1}{tan^{-1}x}$

(b) $tan^{-1}\left(\frac{1}{x}\right)$

(c) $-tan^{-1}x$

(d) $-Cos^{-1}x$

31) $cosec^{-1}x$?

(a) $Sec^{-1}x$

(b) $Sin^{-1}x$



(c) $\frac{1}{sin^{-1}(x)}$

(d) $sin^{-1}\left(\frac{1}{x}\right)$

32) The value of $sin\left[cos^{-1}\left(\frac{3}{4}\right)\right] =$

(a) $\frac{7}{4}$

(b) $\frac{\sqrt{7}}{4}$

(c) $\frac{4}{7}$

(d) $\frac{5}{4}$

33) Domain of $\sec^{-1}x = ?$

(a) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(b) $\left\{-\frac{\pi}{2}, \frac{\pi}{2}\right\}$

(c) $[0, \pi]$

(d) $x \geq 1, x \leq -1$

34) Domain of $\cot^{-1}x$ is

(a) R

(b) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

(c) $(-1, 1)$

(d) $x \geq 1, x \leq -1$

35) Range of $cos^{-1}x$ is

(a) [-1,1]

(b) $[0, \pi]$

(c) $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

(d) none

36) $Tan\left(cos^{-1}\left(-\frac{1}{2}\right)\right) = ?$

(a) $\frac{1}{2}$

(b) $-\sqrt{3}$

(c) $-\frac{1}{\sqrt{3}}$

(d) $-\sqrt{3}$

37) $sin^{-1}(1) + cos^{-1}(1) = ?$

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{2}$

(c) -1

(d) 1





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38) The principle value of $\cot^{-1}(-1)$ is

(a) $\frac{3\pi}{4}$
(b) $\frac{\pi}{4}$
(c) $-\frac{\pi}{4}$
(d) $\frac{5\pi}{4}$

39) Trigonometric equation contains _____ trigonometric functions

(a) At least one
(b) At the most one
(c) Exactly four
(d) Exactly one

40) Basic trigonometric functions are

(a) 1 -1
(b) Continuous
(c) Periodic
(d) Non-periodic

41) A trigonometric equation may have _____ solutions when principle angle is known

(a) Only one
(b) Two
(c) Many
(d) Infinite

42) To solve a trigonometric equation, firstly we find the solution over the interval which is

(a) Domain
(b) Range
(c) Period
(d) None of these

43) The solution of $\sin^2 x = \frac{3}{4}$ is

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

44) If $x = \tan^{-1}\left(\frac{1}{2}\right), y = \tan^{-1}\left(\frac{1}{3}\right)$, then $x + y = ?$

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



45) $tan\left(\sin^{-1}\left(-\frac{1}{2}\right)\right) = ?$

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

46) $cos(\tan^{-1}\infty) = ?$

(a) 0
(b) $\infty$
(c) $\frac{\pi}{2}$
(d) $\frac{\pi}{3}$

47) If $x + y = \frac{5}{6}, xy = \frac{1}{6}$ then $\tan^{-1}x + \tan^{-1}y = ?$

(a) 1
(b) $\frac{\pi}{4}$
(c) $\frac{\pi}{2}$
(d) $\frac{\pi}{6}$

48) $\frac{1}{x}\sin\left(\csc^{-1}\left(\frac{1}{x}\right)\right) = ?$

(a) x
(b) $\frac{1}{x}$
(c) 1
(d) -1

49) Solution of $cos4x + 1 = cos2x$ is

(a) $\frac{\pi}{3}$
(b) $\frac{\pi}{6}$
(c) $\frac{n\pi}{12}$
(d) $\frac{n\pi}{3}$

50) If $4\sin^{-1}(x) + \cos^{-1}(x) = \pi$ then $x = ?$

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

51) $\cos^{-1}\left(\cos\frac{6\pi}{7}\right) = ?$

(a) $\frac{\pi}{7}$

(b) $\frac{6\pi}{7}$

(c) $\frac{8\pi}{7}$

(d) $\frac{11\pi}{7}$

52) Number of solution of $\tan x + \sec x = 2\cos x$, $x \in [0, 2\pi]$ are

(a) 0

(b) 1

(c) 2

(d) 3

53) Domain of the function $\sin^{-1}(x)$ is _____

(a) $(-\pi, \pi)$

(b) $[-1, 1]$

(c) $(0, 2\pi)$

(d) $(-\infty, \infty)$

54) $\tan(\cos^{-1}(x)) = ?$

(a) $\frac{\sqrt{1-x^2}}{x}$

(b) $\frac{x}{\sqrt{1+x^2}}$

(c) $\frac{\sqrt{1+x^2}}{x}$

(d) $\frac{x}{\sqrt{1-x^2}}$

55) $\sin[2\sin^{-1}(0.8)] = ?$

(a) 1,2

(b) 1,6

(c) 0.48

(d) 0.96

56) $2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{4}\right) = ?$

(a) $\tan^{-1}\left(\frac{16}{13}\right)$

(b) $\frac{\pi}{2}$

(c) 0

(d) $\frac{\pi}{4}$







| Chapter # 13 & 14 | | | |
|---|---|---|---|
| 1 | b | 41 | d |
| 2 | b | 42 | a |
| 3 | a | 43 | a |
| 4 | c | 44 | d |
| 5 | d | 45 | a |
| 6 | d | 46 | a |
| 7 | b | 47 | b |
| 8 | b | 48 | c |
| 9 | d | 49 | b |
| 10 | d | 50 | b |
| 11 | a | 51 | b |
| 12 | d | 52 | b |
| 13 | b | 53 | b |
| 14 | d | 54 | a |
| 15 | d | 55 | d |
| 16 | a | 56 | a |
| 17 | c | | |
| 18 | a | | |
| 19 | a | | |
| 20 | a | | |
| 21 | b | | |
| 22 | c | | |
| 23 | c | | |
| 24 | d | | |
| 25 | a | | |
| 26 | d | | |
| 27 | d | | |
| 28 | a | | |
| 29 | c | | |
| 30 | b | | |
| 31 | b | | |
| 32 | b | | |
| 33 | d | | |
| 34 | a | | |
| 35 | b | | |
| 36 | b | | |
| 37 | b | | |
| 38 | a | | |
| 39 | a | | |
| 40 | c | | |