GPLUS EDUCATION

Date :
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INVERSE TRIGONOMETRICE FUNCTIONS

Single Correct Answer Type

1. $2\tan^{-1}\left(\frac{1}{3}\right)+\tan^{-1}\left(\frac{1}{7}\right)$is equal to

a) $\left(\frac{49}{29}\right)$ b) $\frac{\pi}{2}$ c) $-\left(\frac{49}{29}\right)$ d) $\frac{\pi}{4}$

2. The equation $\sin^{-1}x-\cos^{-1}x=\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ has

a) No solution b) Unique solution
c) Infinite number of solutions d) None of the above

3. If $\cos^{-1}x+\cos^{-1}y=\frac{\pi}{2}$ and $\tan^{-1}x-\tan^{-1}y=0$, then x^2+xy+y^2 is equal to

a) 0 b) $\frac{1}{\sqrt{2}}$ c) $\frac{3}{2}$ d) $\frac{1}{8}$

4. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{3\pi}{2}$, then the value of $x^{100}+y^{100}+z^{100}-\frac{9}{x^{101}+y^{101}+z^{101}}$, is

a) 0 b) 1 c) 2 d) 3

5. If $\frac{1}{2}\leq x\leq 1$, then $\sin^{-1}(3x-4x^3)$ equals

a) $3\sin^{-1}x$ b) $\pi-3\sin^{-1}x$ c) $-\pi-3\sin^{-1}x$ d) None of these

6. 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) $3+\sqrt{5}$ c) $\frac{1}{2}(3-\sqrt{5})$ d) None of these

7. $\sum_{m=1}^{n}\tan^{-1}\left(\frac{2m}{m^4+m^2+2}\right)$ is equal to

a) $\tan^{-1}\left(\frac{n^2+n}{n^2+n+2}\right)$ b) $\tan^{-1}\left(\frac{n^2-n}{n^2-n+2}\right)$ c) $\tan^{-1}\left(\frac{n^2+n+2}{n^2+n}\right)$ d) None of these

8. If the mapping $f(x)=ax+b, a>0$ maps $[-1,1]$ onto $[0,\ 2]$ then $\cot[\cot^{-1}7+\cot^{-1}8+\cot^{-1}18]$ is equal to

a) $f(-1)$ b) $f(0)$ c) $f(1)$ d) $f(2)$

9. If $-1<x<1$, then $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ equals

a) $2\tan^{-1}x$ b) $-\pi+2\tan^{-1}x$ c) $\pi+2\tan^{-1}x$ d) None of these

10. If $x\geq 1$, then $2\tan^{-1}x+\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is equal to

a) $4\tan^{-1}x$ b) 0 c) $\pi/2$ d) π

11. If we consider only the principle value of the inverse trigonometric functions, then the value of $\tan\left(\cos^{-1}\frac{1}{5\sqrt{2}}-\sin^{-1}\frac{4}{\sqrt{17}}\right)$ is

a) $\sqrt{\frac{29}{3}}$ b) $\frac{29}{3}$ c) $\sqrt{\frac{3}{29}}$ d) $\frac{3}{29}$

12. $\cos^{-1}\left(\frac{15}{17}\right)+2\tan^{-1}\left(\frac{1}{5}\right)=$

a) $\frac{\pi}{2}$ b) $\cos^{-1}\left(\frac{171}{221}\right)$ c) $\frac{\pi}{4}$ d) None of these

13. If $a>b>0$, then the value of $\tan^{-1}\left(\frac{a}{b}\right)+\tan^{-1}\left(\frac{a+b}{a-b}\right)$ depends on

a) Both a and b b) b and not a c) a and not b d) Neither a nor b

14. If $\sin^{-1}(2x\sqrt{1-x^2}) - 2\sin^{-1} x = 0$, then x belongs to the interval

a) $[-1, 1]$ b) $[-1/\sqrt{2}, 1/\sqrt{2}]$ c) $[-1, -1/\sqrt{2}]$ d) $[1/\sqrt{2}, 1]$

15. If $x > -\frac{1}{\sqrt{3}}$, then $\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$ equals

a) $3\tan^{-1} x$ b) $-\pi + 3\tan^{-1} x$ c) $\pi + 3\tan^{-1} x$ d) None of these

16. If the $(\cos^{-1} x) = \sin\left(\cot^{-1}\frac{1}{2}\right)$, then x is equal to

a) $\pm\frac{5}{3}$ b) $\pm\frac{\sqrt{5}}{3}$ c) $\pm\frac{5}{\sqrt{3}}$ d) None of these

17. The value of x for which $\cos^{-1}(\cos 4) > 3x^2 - 4x$ is

a) $\left(0, \frac{2+\sqrt{6\pi-8}}{3}\right)$ b) $\left(\frac{2-\sqrt{6\pi-8}}{3}, 0\right)$

c) $(-2,2)$ d) $\left(\frac{2-\sqrt{6\pi-8}}{3}, \frac{2+\sqrt{6\pi-8}}{3}\right)$

18. The solution of $\tan^{-1} 2\theta + \tan^{-1} 3\theta = \frac{\pi}{4}$ is

a) $\frac{1}{\sqrt{3}}$ b) $\frac{1}{3}$ c) $\frac{1}{6}$ d) $\frac{1}{\sqrt{6}}$

19. Cos $[\tan^{-1}\{\sin(\cot^{-1} x)\}]$ is equal to

a) $\sqrt{\frac{x^2+2}{x^2+3}}$ b) $\sqrt{\frac{x^2+2}{x^2+1}}$ c) $\sqrt{\frac{x^2+1}{x^2+2}}$ d) None of these

20. If $\frac{1}{\sqrt{2}} \le x \le 1$, then $\sin^{-1}(2x\sqrt{1-x^2})$ equals

a) $2\sin^{-1} x$ b) $\pi - 2\sin^{-1} x$ c) $-\pi - 2\sin^{-1} x$ d) None of these

21. If $\cot(\cos^{-1} x) = \sec\left(\tan^{-1}\frac{a}{\sqrt{b^2-a^2}}\right)$, then x is equal to

a) $\frac{b}{\sqrt{2b^2-a^2}}$ b) $\frac{a}{\sqrt{2b^2-a^2}}$ c) $\frac{\sqrt{2b^2-a^2}}{a}$ d) $\frac{\sqrt{2b^2-a^2}}{b}$

22. If $x \in (-\infty, -1)$, then $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ equals

a) $2\tan^{-1} x$ b) $\pi - 2\tan^{-1} x$ c) $-\pi - 2\tan^{-1} x$ d) None of these

23. The value of $\cos^{-1}\left(-\frac{1}{2}\right)$ among the following, is

a) $\frac{9\pi}{3}$ b) $\frac{8\pi}{3}$ c) $\frac{5\pi}{3}$ d) $\frac{11\pi}{3}$

24. $\cos^{-1}\frac{1}{2} + 2\sin^{-1}\frac{1}{2}$ is equal to

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

25. The value of

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

a) 1 b) 2 c) 3 d) 4

26. If $\theta = \tan^{-1} a, \phi = \tan^{-1} b$ and $ab = -1$, then $(\theta - \phi)$ is equal to

a) 0 b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) None of these

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

a) $\frac{19\pi}{12}$ b) $\frac{35\pi}{12}$ c) $\frac{47\pi}{12}$ d) $\frac{43\pi}{12}$

28. The solution set of the equation $\tan^{-1} x - \cot^{-1} x = \cos^{-1}(2-x)$ is

a) $[0,1]$ b) $[-1,1]$ c) $[1,3]$ d) None of these

29. The smallest and the largest values of $\tan^{-1}\left(\frac{1-x}{1+x}\right), 0 \le x \le 1$ are

a) $0, \pi$ b) $0, \frac{\pi}{4}$ c) $-\frac{\pi}{4}, \frac{\pi}{4}$ d) $\frac{\pi}{4}, \frac{\pi}{2}$

30. If $\tan^{-1}(x-1) + \tan^{-1} x + \tan^{-1}(x+1) = \tan^{-1} 3x$, then x is

a) $\pm\frac{1}{2}$ b) $0, \frac{1}{2}$ c) $0, -\frac{1}{2}$ d) $0, \pm\frac{1}{2}$

31. $\sum_{m=1}^{n} \tan^{-1}\left(\frac{2m}{m^4+m^2+2}\right)$ is equal to

a) $\tan^{-1}\left(\frac{n^2+n}{n^2+n+2}\right)$ b) $\tan^{-1}\left(\frac{n^2-n}{n^2-n+2}\right)$ c) $\tan^{-1}\left(\frac{n^2+n+2}{n^2+n}\right)$ d) None of these

32. $\sum_{m=1}^{n} \tan^{-1}\left(\frac{2m}{m^4+m^2+2}\right)$ is equal to

a) $\tan^{-1}\left(\frac{n^2+n}{n^4+n^2+2}\right)$ b) $\tan^{-1}\left(\frac{n^2-n}{n^2-n+2}\right)$ c) $\tan^{-1}(n^2+n+2)$ d) None of these

33. $\sin^{-1}\left(\frac{3}{5}\right) + \tan^{-1}\left(\frac{1}{7}\right) =$

a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) $\cos^{-1}\left(\frac{4}{5}\right)$ d) π

34. The value of $\cos\left[\frac{1}{2}\cos^{-1}\left\{\cos\left(\sin^{-1}\frac{\sqrt{63}}{8}\right)\right\}\right]$, is

a) $\frac{3}{16}$ b) $\frac{3}{8}$ c) $\frac{3}{4}$ d) $\frac{3}{2}$

35. If $A = 2\tan^{-1}(2\sqrt{2}-1)$ and $B = 3\sin^{-1}\frac{1}{3} + \sin^{-1}\frac{3}{5}$, then

a) $A = B$ b) $A < B$ c) $A > B$ d) None of these

36. If $-\frac{1}{2} \le x \le \frac{1}{2}$, then $\sin^{-1}(3x - 4x^3)$ equals

a) $3\sin^{-1} x$ b) $\pi - 3\sin^{-1} x$ c) $-\pi - 3\sin^{-1} x$ d) None of these

37. The equation $2\cos^{-1} x + \sin^{-1} x = \frac{11\pi}{6}$ has

a) No solution b) Only one solution c) Two solutions d) Three solutions

38. If $\sec^{-1}\sqrt{1+x^2} + \operatorname{cosec}^{-1}\frac{\sqrt{1+y^2}}{y} + \cot^{-1}\frac{1}{z} = \pi$, then $x+y+z$ is equal to

a) xyz b) $2xyz$ c) xyz^2 d) x^2yz

39. If $x^2 + y^2 + z^2 = r^2$, then

$\tan^{-1}\left(\frac{xy}{zr}\right) + \tan^{-1}\left(\frac{yz}{xr}\right) + \tan^{-1}\left(\frac{xz}{yr}\right)$ is equal to

a) π b) $\frac{\pi}{2}$ c) 0 d) None of these

40. The equation $2\cos^{-1} x + \sin^{-1} x = \frac{11\pi}{6}$ has

a) No solution b) Only one solution c) Two solutions d) Three solutions

41. If $\cos^{-1}\frac{3}{5} - \sin^{-1}\frac{4}{5} = \cos^{-1} x$, then x is equal to

a) 0 b) 1 c) -1 d) None of these

42. Number of solutions of the equation

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

a) 1 b) 2 c) 3 d) 4

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

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

44. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then x is

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

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

a) 3 b) 5 c) 7 d) 11

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

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

47. The number of triplets (x, y, z)satisfying $\sin^{-1} x+\cos^{-1} y+\sin^{-1} z=2\pi$, is

a) 0 b) 2 c) 1 d) Infinite

48. If $\theta_1=\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{1}{3}$ and $\theta_2=\cos^{-1}\frac{4}{5}+\cos^{-1}\frac{1}{3}$, then

a) $\theta_1>\theta_2$ b) $\theta_1=\theta_2$ c) $\theta_1<\theta_2$ d) None of these

49. Solution of the equation $\cot^{-1} x+\sin^{-1}\frac{1}{\sqrt{5}}=\frac{\pi}{4}$ is

a) $x=3$ b) $x=\frac{1}{\sqrt{5}}$ c) $x=0$ d) None of these

50. If $\tan^{-1}(x+2)+\tan^{-1}(x-2)-\tan^{-1}\left(\frac{1}{2}\right)=0$, then one of the values of x is equal to

a) -1 b) 5 c) $\frac{1}{2}$ d) 1

51. $\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)-\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ is equal to

a) 0 b) 1 c) $\tan^{-1} x$ d) $\tan^{-1} 2x$

52. $\cot\left\{\cos^{-1}\left(\frac{7}{25}\right)\right\}=$

a) $\frac{25}{24}$ b) $\frac{25}{7}$ c) $\frac{24}{25}$ d) None of these

53. The value of $\sin\left[\frac{\pi}{2}-\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$ is

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

54. If $\alpha=\sin^{-1}\frac{\sqrt{3}}{2}+\sin^{-1}\frac{1}{3}$ and $\beta=\cos^{-1}\frac{\sqrt{3}}{2}+\cos^{-1}\frac{1}{3}$, then

a) $\alpha>\beta$ b) $\alpha=\beta$ c) $\alpha<\beta$ d) $\alpha+\beta=2\pi$

55. $\tan^{-1}\frac{x}{y}-\tan^{-1}\frac{x-y}{x+y}$ is equal to
(where $x<y>0$)

a) $-\frac{\pi}{4}$ b) $\frac{\pi}{4}$ c) $\frac{3\pi}{4}$ d) None of these

56. If $x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$, then the value of
$\tan^{-1}\left(\frac{\tan x}{4}\right)+\tan^{-1}\left(\frac{3\sin 2x}{5+3\cos 2x}\right)$ is

a) $\frac{x}{2}$ b) $2x$ c) $3x$ d) x

57. $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1} x\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1} x\right), x\neq 0$ is equal to

a) x b) $2x$ c) $\frac{2}{x}$ d) None of these

58. If $\sin^{-1} x-\cos^{-1} x=\frac{\pi}{6}$, then x is

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

59. The value of $\sec\left[\tan^{-1}\left(\frac{b+a}{b-a}\right)-\tan^{-1}\left(\frac{a}{b}\right)\right]$ is

a) 2 b) $\sqrt{2}$ c) 4 d) 1

60. The value of $\cos(2\cos^{-1} x+\sin^{-1} x)$ at $x=\frac{1}{5}$ is

a) 1 b) 3 c) 0 d) $-\frac{2\sqrt{6}}{5}$

61. If $\tan^{-1} a + \tan^{-1} b = \sin^{-1} 1 - \tan^{-1} c$, then
a) $a + b + c = abc$
b) $ab + bc + ca = abc$
c) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} - \frac{1}{abc} = 0$
d) $ab + bc + ca = a + b + c$
62. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z + \cos^{-1} t = 4\pi$, then the value of $x^2 + y^2 + z^2 + t^2$is
a) $xy + zy + zt$ b) $1 - 2xyzt$ c) 4 d) 6
63. If $\frac{1}{2} \leq x \leq 1$, then $\cos^{-1}(4x^3 - 3x)$ equals
a) $3\cos^{-1} x$ b) $2\pi - 3\cos^{-1} x$ c) $-2\pi - 3\cos^{-1} x$ d) None of these
64. The value of $\sin^{-1}\left(\cos\frac{33\pi}{5}\right)$ is
a) $\frac{3\pi}{5}$ b) $\frac{7\pi}{5}$ c) $\frac{\pi}{10}$ d) $-\frac{\pi}{10}$
65. If $\sin^{-1} x + \sin^{-1}(1 - x) = \cos^{-1} x$, then x equals
a) $1, -1$ b) 1, 0 c) $0, \frac{1}{2}$ d) None of these
66. If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$, then the value of x is
a) -1 b) 2/5 c) 1/3 d) 1/5
67. If a, b, c be positive real number and the value of

$$\theta = \tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}} + \tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}} + \tan^{-1}\sqrt{\frac{c(c+b+c)}{ab}}$$

Then $\tan\theta$ is equal to
a) 0 b) 1 c) $\frac{a+b+c}{abc}$ d) None of these
68. The value of $\sin^{-1}\{\cos(4095°)\}$ is equal to
a) $-\frac{\pi}{3}$ b) $\frac{\pi}{6}$ c) $-\frac{\pi}{4}$ d) $\frac{\pi}{4}$
69. The greatest and the least values of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3$ are respectively
a) $-\frac{\pi}{2}, \frac{\pi}{2}$ b) $-\frac{\pi^3}{8}, \frac{\pi^3}{8}$ c) $\frac{\pi^3}{32}, \frac{7\pi^3}{8}$ d) None of these
70. The value of $\cot^{-1}\frac{xy+1}{x-y} + \cot^{-1}\frac{yz+1}{y-z} + \cot^{-1}\frac{zx+1}{z-x}$ is
a) 0 b) 1
c) $\cot^{-1} x + \cot^{-1} y + \cot^{-1} z$ d) None of the above
71. If $\alpha = \sin^{-1}\frac{\sqrt{3}}{2} + \sin^{-1}\frac{1}{3}, \beta = \cos^{-1}\frac{\sqrt{3}}{2} + \cos^{-1}\frac{1}{3}$, then
a) $\alpha > \beta$ b) $\alpha = \beta$ c) $\alpha < \beta$ d) $\alpha + \beta = 2\pi$
72. $\tan^{-1}\frac{c_1 x - y}{c_1 y + x} + \tan^{-1}\frac{c_2 - c_1}{1 + c_2 c_1} + \tan^{-1}\frac{c_3 - c_2}{1 + c_3 c_2} + \ldots + \tan^{-1}\frac{1}{c_n}$ is equal to
a) $\tan^{-1}\frac{y}{x}$ b) $\tan^{-1} yx$ c) $\tan^{-1}\frac{x}{y}$ d) $\tan^{-1}(x - y)$
73. If α, β are the roots of the equation $6x^2 - 5x + 1 = 0$, then the value of $\tan^{-1}\alpha + \tan^{-1}\beta$ is
a) 0 b) $\pi/4$ c) 1 d) $\pi/2$
74. The greatest and the least values of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3$ are respectively
a) $-\frac{\pi}{2}, \frac{\pi}{2}$ b) $-\frac{\pi^3}{8}, \frac{\pi^3}{8}$ c) $\frac{\pi^3}{32}, \frac{7\pi^3}{8}$ d) None of these
75. If $\sin^{-1}(1 - x) - 2\sin^{-1} x = \frac{\pi}{2}$, then x equals
a) $0, -\frac{1}{2}$ b) $0, \frac{1}{2}$ c) 0 d) None of these

76. If $\sin^{-1}\alpha+\sin^{-1}\beta+\sin^{-1}\gamma=\frac{3\pi}{2}$, then $\alpha\beta+\alpha\gamma+\beta\gamma$ is equal to

a) 1 b) 0 c) 3 d) -3

77. If $-\frac{\pi}{2}<\sin^{-1}x<\frac{\pi}{2}$, then $\tan(\sin^{-1}x)$ is equal to

a) $\frac{x}{1-x^2}$ b) $\frac{x}{1+x^2}$ c) $\frac{x}{\sqrt{1-x^2}}$ d) $\frac{1}{\sqrt{1-x^2}}$

78. The value of $\sum_{r=0}^{\infty}\tan^{-1}\left(\frac{1}{1+r+r^2}\right)$ is equal to

a) $\frac{\pi}{2}$ b) $\frac{3\pi}{4}$ c) $\frac{\pi}{4}$ d) None of these

79. The value of x for which $\cos^{-1}(\cos 4)>3x^2-4x$ is

a) $\left(0,\frac{2+\sqrt{6\pi-8}}{3}\right)$ b) $\left(\frac{2-\sqrt{6\pi-8}}{3},0\right)$

c) $(-2,2)$ d) $\left(\frac{2-\sqrt{6\pi-8}}{3},\frac{2+\sqrt{6\pi-8}}{3}\right)$

80. The value of $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{7}{8}$ is

a) $\tan^{-1}\frac{7}{8}$ b) $\cot^{-1}15$ c) $\tan^{-1}15$ d) $\tan^{-1}\frac{25}{24}$

81. If $2\sin^{-1}x=\sin^{-1}(2x\sqrt{1-x^2})$, then x is equal to

a) $[-1,1]$ b) $\left[-\frac{1}{\sqrt{2}},1\right]$ c) $\left[-\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}}\right]$ d) None of these

82. If $x\in(1,\infty)$, then $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ equals

a) $2\tan^{-1}x$ b) $-\pi+2\tan^{-1}x$ c) $\pi+2\tan^{-1}x$ d) None of these

83. If $x<0$, then $\tan^{-1}\left(\frac{1}{x}\right)$ equals

a) $\cot^{-1}x$ b) $-\cot^{-1}x$ c) $-\pi+\cot^{-1}x$ d) $-\pi-\cot^{-1}x$

84. The value of $\cot^{-1}\frac{3}{4}+\sin^{-1}\frac{5}{13}$ is

a) $\sin^{-1}\frac{63}{65}$ b) $\sin^{-1}\frac{12}{13}$ c) $\sin^{-1}\frac{65}{68}$ d) $\sin^{-1}\frac{5}{12}$

85. $\tan^{-1}\frac{c_1x-y}{c_1y+x}+\tan^{-1}\frac{c_2-c_1}{1+c_2c_1}+\tan^{-1}\frac{c_3-c_2}{1+c_3c_2}+\ldots+\tan^{-1}\frac{1}{c_n}$ is equal to

a) $\tan^{-1}\frac{y}{x}$ b) $\tan^{-1}yx$ c) $\tan^{-1}\frac{x}{y}$ d) $\tan^{-1}(x-y)$

86. If $\tan^{-1}2$ and $\tan^{-1}3$ are two angles of a triangle, then the third angle is

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

87. The value of $'a'$ for which $ax^2+\sin^{-1}(x^2-2x+2)+\cos^{-1}(x^2-2x+2)=0$ has a real solution, is

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

88. Let $\cos(2\tan^{-1}x)=\frac{1}{2}$, then the value of x is

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

89. If x_1,x_2,x_3,x_4 are the roots of the equation $x^4-x^3\sin 2\beta-x\cos\beta-\sin\beta=0$, then $\tan^{-1}+\tan^{-1}x_2+\tan^{-1}x_3+\tan^{-1}x_4$ is equal to

a) β b) $\frac{\pi}{2}-\beta$ c) $\pi-\beta$ d) $-\beta$

90. If $A=\tan^{-1}\left(\frac{x\sqrt{3}}{2k-x}\right)$ and $B=\tan^{-1}\left(\frac{2x-k}{k\sqrt{3}}\right)$, then the value of $A-B$ is

a) 10° b) 45° c) 60° d) 30°

91. The value of $\cos(2\cos^{-1}0.8)$ is

a) 0.48 b) 0.96 c) 0.6 d) None of these

92. The value of x, where $x > 0$ and $\tan\left\{\sec^{-1}\left(\frac{1}{x}\right)\right\} = \sin(\tan^{-1} 2)$ is

a) $\sqrt{5}$ b) $\frac{\sqrt{5}}{3}$ c) 1 d) $\frac{2}{3}$

93. If $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{3}{4}\right) - \tan^{-1}\left(\frac{x}{3}\right) = 0$, then x is equal to

a) $\frac{7}{3}$ b) 3 c) $\frac{11}{3}$ d) $\frac{13}{3}$

94. If $(\tan^{-1} x)^2 + (\cot^{-1} x)^2 = \frac{5\pi^2}{8}$, then x equals

a) -1 b) 1 c) 0 d) None of these

95. If $-1 \leq x \leq -\frac{1}{2}$, then $\sin^{-1}(3x - 4x^3)$ equals

a) $3\sin^{-1} x$ b) $\pi - 3\sin^{-1} x$ c) $-\pi - 3\sin^{-1} x$ d) None of these

96. If $\cos^{-1} p + \cos^{-1} q + \cos^{-1} r = 3\pi$, then $p^2 + q^2 + r^2 + 2pqr$ is equal to

a) 3 b) 1 c) 2 d) -1

97. If $a < \frac{1}{32}$, then the number of solutions of $(\sin^{-1} x)^3 + (\cos^{-1} x)^3 = a\,\pi^3$, is

a) 0 b) 1 c) 2 d) Infinite

98. The value of $'a'$ for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 0$ has a real solution, is

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

99. If $x = \sin(2\tan^{-1} 2)$ and $y = \sin\left(\frac{1}{2}\tan^{-1}\frac{4}{3}\right)$, then

a) $x = y^2$ b) $y^2 = 1 - x$ c) $x^2 = \frac{y}{2}$ d) $y^2 = 1 + x$

100. The solution of $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$ is

a) $\frac{1}{6}$ b) -1 c) $\left(\frac{1}{6}, -1\right)$ d) None of these

101. If $A = \tan^{-1} x\,, x \in R$, then the value of $\sin 2\,A$ is

a) $\frac{2\,x}{1 - x^2}$ b) $\frac{2\,x}{\sqrt{1 - x^2}}$ c) $\frac{2\,x}{1 + x^2}$ d) $\frac{1 - x^2}{1 + x^2}$

102. Sum of infinite terms of the series

$\cot^{-1}\left(1^2 + \frac{3}{4}\right) + \cot^{-1}\left(2^2 + \frac{3}{4}\right) + \cot^{-1}\left(3^2 + \frac{3}{4}\right) + \ldots$ is

a) $\frac{\pi}{4}$ b) $\tan^{-1}(2)$ c) $\tan^{-1} 3$ d) None of these

103. $\tan\left[\frac{1}{2}\sin^{-1}\left(\frac{2a}{1+a^2}\right) + \frac{1}{2}\cos^{-1}\left(\frac{1-a^2}{1+a^2}\right)\right]$ is equal to

a) $\frac{2a}{1 + a^2}$ b) $\frac{1 - a^2}{1 + a^2}$ c) $\frac{2a}{1 - a^2}$ d) None of these

104. If $\sin^{-1}\frac{1}{3} + \sin^{-1}\frac{2}{3} = \sin^{-1} x$, then the value of x is

a) 0 b) $\frac{(\sqrt{5} - 4\sqrt{2})}{9}$ c) $\frac{(\sqrt{5} + 4\sqrt{2})}{9}$ d) $\frac{\pi}{2}$

105. The value of $\tan^{-1}(1) + \tan^{-1}(0) + \tan^{-1}(2) + \tan^{-1}(3)$ is equal to

a) π b) $\frac{5\pi}{4}$ c) $\frac{\pi}{2}$ d) None of these

106. The sum of the two angles $\cot^{-1} 3$ and $\operatorname{cosec}^{-1}\sqrt{5}$, is

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

107. $\cos\left\{\cos^{-1}\left(-\frac{1}{7}\right) + \sin^{-1}\left(-\frac{1}{7}\right)\right\} =$

a) $-\frac{1}{3}$ b) 0 c) $\frac{1}{3}$ d) $\frac{4}{9}$

108. The simplified expression of $\sin(\tan^{-1} x)$, for any real number x is given by

a) $\frac{1}{\sqrt{1+x^2}}$ b) $\frac{x}{\sqrt{1+x^2}}$ c) $-\frac{1}{\sqrt{1+x^2}}$ d) $-\frac{x}{\sqrt{1+x^2}}$

109. If $\tan^{-1} x + \tan^{-1} y = \frac{\pi}{4}$, then
a) $x + y + xy = 1$ b) $x + y - xy = 1$
c) $x + y + xy + 1 = 0$ d) $x + y - xy + 1 = 0$

110. The value of $\cot^{-1}\frac{3}{4} + \sin^{-1}\frac{5}{13}$ is
a) $\sin^{-1}\frac{63}{65}$ b) $\sin^{-1}\frac{12}{13}$ c) $\sin^{-1}\frac{65}{68}$ d) $\sin^{-1}\frac{5}{12}$

111. The solution of $\tan^{-1} x + 2\cot^{-1} x = \frac{2\pi}{3}$ is
a) $-\frac{1}{\sqrt{3}}$ b) $\frac{1}{\sqrt{3}}$ c) $-\sqrt{3}$ d) $\sqrt{3}$

112. $\cos^{-1}\left\{\frac{1}{2}x^2 + \sqrt{1-x^2}\sqrt{1-\frac{x^2}{4}}\right\} = \cos^{-1}\frac{x}{2} - \cos^{-1} x$ holds for
a) $|x| \le 1$ b) $x \in R$ c) $0 \le x \le 1$ d) $-1 \le x \le 0$

113. $\sec^2(\tan^{-1} 2) + \mathrm{cosec}^2\,(\cot^{-1} 3)$ is equal to
a) 1 b) 5 c) 10 d) 15

114. If $4\sin^{-1} x + \cos^{-1} x = \pi$, then x is equal to
a) 0 b) 1/2 c) -1/2 d) 1

115. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, then
a) $x^2 + y^2 = z^2$ b) $x^2 + y^2 + z^2 = 0$
c) $x^2 + y^2 + z^2 = 1 - 2xyz$ d) None of the above

116. $\tan^{-1}\frac{m}{n} - \tan^{-1}\frac{m-n}{m+n}$ is equal to
a) $\tan^{-1}\frac{n}{m}$ b) $\tan^{-1}\frac{m+n}{m-n}$ c) $\frac{\pi}{4}$ d) $\tan^{-1}\left(\frac{1}{2}\right)$

117. If θ and ϕ are the roots of the equation $8x^2 + 22x + 5 = 0$, then
a) Both $\sin^{-1}\theta$ and $\sin^{-1}\phi$ are equal b) Both $\sec^{-1}\theta$ and $\sec^{-1}\phi$ are equal
c) Both $\tan^{-1}\theta$ and $\tan^{-1}\phi$ are equal d) None of the above

118. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$, then $x^4 + y^4 + z^4 + 4x^2y^2z^2 = k(x^2y^2 + y^2z^2 + z^2x^2)$ Where k is equal to
a) 1 b) 2 c) 4 d) none of these

119. If $[\cot^{-1} x] + [\cos^{-1} x] = 0$, where x is a non-negative real number and [.] denotes the greatest integer function, then complete set of values of x is
a) $(\cos 1, 1]$ b) $(\cot 1, 1)$ c) $(\cos 1, \cot 1)$ d) None of these

120. $\frac{\alpha^3}{2}\mathrm{cosec}^2\left(\frac{1}{2}\tan^{-1}\frac{\alpha}{\beta}\right) + \frac{\beta^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\left(\frac{\beta}{\alpha}\right)\right)$ is
a) $(\alpha-\beta)(\alpha^2+\beta^2)$ b) $(\alpha+\beta)(\alpha^2-\beta^2)$ c) $(\alpha+\beta)(\alpha^2+\beta^2)$ d) None of these

121. Solution set of $[\sin^{-1} x] > [\cos^{-1} x]$, white [.]denote the greatest integer function , is
a) $\left[\frac{1}{\sqrt{2}}, 1\right]$ b) $(\cos 1, \sin 1)$ c) $[\sin 1, 1]$ d) None of these

122. If $\sin^{-1}\left(\frac{x}{5}\right) + \mathrm{cosec}^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then value of x is
a) 1 b) 3 c) 4 d) 5

123. If $\sum_{i=1}^{20} \sin^{-1} x_i = 10\pi$,then $\sum_{i=1}^{20} x_i$ is equal to
a) 20 b) 10 c) 0 d) None of these

124. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\,\mathrm{cosec}\,x)$, then the value of x is
a) $\frac{3\pi}{4}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) None of these

125. The value of $\cot^{-1}\frac{xy+1}{x-y} + \cot^{-1}\frac{yz+1}{y-z} + \cot^{-1}\frac{zx+1}{z-x}$ is

a) 0 b) 1
c) $\cot^{-1}x+\cot^{-1}y+\cot^{-1}z$ d) None of the above

126. If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=3\pi$, then $xy+yz+zx$ is equal to
a) 1 b) 0 c) -3 d) 3

127. $\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}x\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x\right), x\neq 0$ is equal to
a) x b) $2x$ c) $\frac{2}{x}$ d) None of these

128. The value of $\tan\left\{\cos^{-1}\left(-\frac{2}{7}\right)-\frac{\pi}{2}\right\}$ is
a) $\frac{2}{3\sqrt{5}}$ b) $\frac{2}{3}$ c) $\frac{1}{\sqrt{5}}$ d) $\frac{4}{\sqrt{5}}$

129. If $\cos^{-1}\sqrt{p}+\cos^{-1}\sqrt{1-p}+\cos^{-1}\sqrt{1-q}=\frac{3\pi}{4}$, then the value of q is
a) 1 b) $\frac{1}{\sqrt{2}}$ c) $\frac{1}{3}$ d) $\frac{1}{2}$

130. If $\sin^{-1}\frac{2a}{1+a^2}-\cos^{-1}\frac{1-b^2}{1+b^2}=\tan^{-1}\frac{2x}{1-x^2}$, then value of x is
a) a b) b c) $\frac{a+b}{1-ab}$ d) $\frac{a-b}{1+ab}$

131. $\cot^{-1}(2.1^2)+\cot^{-1}(2.2^2)+\cot^{-1}(2.3^2)+\ldots$ upto ∞ is equal to
a) $\frac{\pi}{4}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{2}$ d) $\frac{\pi}{5}$

132. If a, b are positive quantities and if $a_1=\frac{a+b}{2}, b_1=\sqrt{a_1 b}, a_2=\frac{a_1+b_1}{2}, b_2=\sqrt{a_2 b_1}$ and so on, then
a) $a_\infty=\frac{\sqrt{b^2-a^2}}{\cos^{-1}\left(\frac{a}{b}\right)}$ b) $b_\infty=\frac{\sqrt{b^2-a^2}}{\cos^{-1}\left(\frac{a}{b}\right)}$ c) $b_\infty=\frac{\sqrt{a^2+b^2}}{\cos^{-1}\left(\frac{b}{a}\right)}$ d) None of these

133. Value of $\tan^{-1}\left(\frac{\sin 2-1}{\cos 2}\right)$ is
a) $\frac{\pi}{2}-1$ b) $1-\frac{\pi}{4}$ c) $2-\frac{\pi}{2}$ d) $\frac{\pi}{4}-1$

134. The trigonometric equation $\sin^{-1}x=2\sin^{-1}a$, has a solution for
a) $\frac{1}{2}<|a|<\frac{1}{\sqrt{2}}$ b) All real values of a c) $|a|\leq\frac{1}{2}$ d) $|a|\geq\frac{1}{\sqrt{2}}$

135. If a, b, c be positive real number and the value of
$$\theta=\tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}}+\tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}}+\tan^{-1}\sqrt{\frac{c(c+b+c)}{ab}}$$
Then $\tan\theta$ is equal to
a) 0 b) 1 c) $\frac{a+b+c}{abc}$ d) None of these

136. If $f(x)=\sin^{-1}\left\{\frac{\sqrt{3}}{2}x-\frac{1}{2}\sqrt{1-x^2}\right\}, -\frac{1}{2}\leq x\leq 1$, then $f(x)$ is equal to
a) $\sin^{-1}\frac{1}{2}-\sin^{-1}x$ b) $\sin^{-1}x-\frac{\pi}{6}$ c) $\sin^{-1}x+\frac{\pi}{6}$ d) None of these

137. The numerical value of $\tan\left(2\tan^{-1}\frac{1}{5}-\frac{\pi}{4}\right)$, is
a) 1 b) 0 c) $\frac{7}{17}$ d) $-\frac{7}{17}$

138. $\sin\left(\frac{1}{2}\cos^{-1}\frac{4}{5}\right)$ is equal to
a) $-\frac{1}{\sqrt{10}}$ b) $\frac{1}{\sqrt{10}}$ c) $-\frac{1}{10}$ d) $\frac{1}{10}$

139. If $\sin^{-1}=\frac{\pi}{5}$, for some $x\in(-1,1)$, then the value of $\cos^{-1}x$ is

a) $\frac{3\pi}{10}$ b) $\frac{5\pi}{10}$ c) $\frac{7\pi}{10}$ d) $\frac{9\pi}{10}$

140. Solution set of $[\sin^{-1} x] > [\cos^{-1} x]$, white [.]denote the greatest integer function , is

a) $\left[\frac{1}{\sqrt{2}}, 1\right]$ b) $(\cos 1, \sin 1)$ c) $[\sin 1, 1]$ d) None of these

141. If $\sin^{-1} x + \sin^{-1}(1 - x) = \cos^{-1} x$, then x belongs to

a) {1, 0} b) {-1, 1} c) $\left\{0, \frac{1}{2}\right\}$ d) {2, 0}

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

a) $\frac{2}{3\sqrt{5}}$ b) $\frac{2}{3}$ c) $\frac{1}{\sqrt{5}}$ d) $\frac{4}{\sqrt{5}}$

143. If $-\frac{1}{2} \leq x \leq \frac{1}{2}$, then $\sin^{-1}(3x - 4x^3)$ equals

a) $3\sin^{-1} x$ b) $\pi - 3\sin^{-1} x$ c) $-\pi - 3\sin^{-1} x$ d) None of these

144. If $\sin\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 1$, then x is equal to

a) 1 b) 0 c) 4/5 d) 1/5

145. If $\sin^{-1}\frac{2a}{1+a^2} - \cos^{-1}\frac{1-b^2}{1+b^2} = \tan^{-1}\frac{2x}{1-x^2}$, then value of x is

a) a b) b c) $\frac{a+b}{1-ab}$ d) $\frac{a-b}{1+ab}$

146. If $\sqrt{3} + i = (a + ib)(c + id)$, then $\tan^{-1}\left(\frac{b}{a}\right) + \tan^{-1}\left(\frac{d}{c}\right)$ has the value

a) $\frac{\pi}{3} + 2n\pi, n \in I$ b) $n\pi + \frac{\pi}{6}, n \in I$ c) $n\pi - \frac{\pi}{3}, n \in I$ d) $2n\pi - \frac{\pi}{3}, n \in I$

147. If $\tan^{-1} a + \tan^{-1} b = \sin^{-1} 1 - \tan^{-1} c$, then

a) $a + b + c = abc$ b) $ab + bc + ca = abc$

c) $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} - \frac{1}{abc} = 0$ d) $ab + bc + ca = a + b + c$

148. If $\tan^{-1} x - \tan^{-1} y = \tan^{-1} A$, then A is equal to

a) $x - y$ b) $x + y$ c) $\frac{x-y}{1+xy}$ d) $\frac{x+y}{1-xy}$

149. If x, y, z are in AP and $\tan^{-1} x, \tan^{-1} y$ and $\tan^{-1} z$ are also in AP, then

a) $x = y = z$ b) $x = y = -z$ c) $x = 1, y = 2, z = 3$ d) $x = 2, y = 4, z = 6$

150. $\cos\left[\cos^{-1}\left(-\frac{1}{7}\right) + \sin^{-1}\left(-\frac{1}{7}\right)\right]$ is equal to

a) $-\frac{1}{3}$ b) 0 c) $\frac{1}{3}$ d) $\frac{4}{9}$

151. If $\theta = \sin^{-1} x + \cos^{-1} x - \tan^{-1} x \geq 0$, then the smallest interval in which θ lies, is given by

a) $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{4}$ b) $-\frac{\pi}{4} \leq \theta \leq 0$ c) $0 \leq \theta \leq \frac{\pi}{4}$ d) $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$

152. $\sin^{-1} x + \sin^{-1}\frac{1}{x} + \cos^{-1} x + \cos^{-1}\frac{1}{x}$ is equal to

a) π b) $\frac{\pi}{2}$ c) $\frac{3\pi}{2}$ d) None of these

153. If $y = \cos^{-1}(\cos 10)$, then y is equal to

a) 10 b) $4\pi - 10$ c) $2\pi + 10$ d) $2\pi - 10$

154. $\sin^{-1}\frac{4}{5} + 2\tan^{-1}\frac{1}{3} =$

a) $\frac{\pi}{3}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) 0

155. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \pi$, then $x^4 + y^4 + z^4 + 4x^2y^2z^2 = k(x^2y^2 + y^2z^2 + z^2x^2)$ Where k is equal to

a) 1 b) 2 c) 4 d) none of these

156. If $\sin^{-1}\frac{2a}{1+a^2}-\cos^{-1}\frac{1-b^2}{1+b^2}=\tan^{-1}\frac{2x}{1-x^2}$, then the value of x is

a) a b) b c) $\frac{a+b}{1-ab}$ d) $\frac{a-b}{1+ab}$

157. If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=\pi$, then

a) $x^2+y^2=z^2$ b) $x^2+y^2+z^2=0$
c) $x^2+y^2+z^2=1-2xyz$ d) None of the above

158. If $x>\frac{1}{\sqrt{3}}$, then $\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$ equals

a) $3\tan^{-1}x$ b) $-\pi+3\tan^{-1}x$ c) $\pi+3\tan^{-1}x$ d) None of these

159. If $\cos^{-1}x=\alpha, (0<x<1)$ and
$\sin^{-1}(2x\sqrt{1-x^2})+\sec^{-1}\left(\frac{1}{2x^2-1}\right)=\frac{2\pi}{3}$, then $\tan^{-1}(2x)$ equals

a) $\pi/6$ b) $\pi/4$ c) $\pi/3$ d) $\pi/2$

160. Which one of the following is correct?

a) $\tan 1>\tan^{-1}1$ b) $\tan 1<\tan^{-1}1$ c) $\tan 1=\tan^{-1}1$ d) None of these

161. The value of $\tan^{-1}(1)+\tan^{-1}(0)+\tan^{-1}(2)+\tan^{-1}(3)$ is equal to

a) π b) $\frac{5\pi}{4}$ c) $\frac{\pi}{2}$ d) None of these

162. If the $(\cos^{-1}x)=\sin\left(\cot^{-1}\frac{1}{2}\right)$, then x is equal to

a) $\pm\frac{5}{3}$ b) $\pm\frac{\sqrt{5}}{3}$ c) $\pm\frac{5}{\sqrt{3}}$ d) None of these

163. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\frac{3\pi}{2}$, then the value of $x^{100}+y^{100}+z^{100}-\frac{9}{x^{101}+y^{101}+z^{101}}$ is

a) 0 b) 1 c) 2 d) 3

164. If $\tan^{-1}\frac{x-1}{x+2}+\tan^{-1}\frac{x+1}{x+2}=\frac{\pi}{4}$, then x is equal to

a) $\frac{1}{\sqrt{2}}$ b) $-\frac{1}{\sqrt{2}}$ c) $\pm\sqrt{\frac{5}{2}}$ d) $\pm\frac{1}{2}$

165. The value of $\sin\left[\frac{\pi}{2}-\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]$ is

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

166. $\cos^{-1}\left(\frac{1}{2}\right)+2\sin^{-1}\left(\frac{1}{2}\right)$ is equal to

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

167. $\tan\left[\frac{1}{2}\sin^{-1}\left(\frac{2a}{1+a^2}\right)+\frac{1}{2}\cos^{-1}\left(\frac{1-a^2}{1+a^2}\right)\right]$ is equal to

a) $\frac{2a}{1+a^2}$ b) $\frac{1-a^2}{1+a^2}$ c) $\frac{2a}{1-a^2}$ d) None of these

168. If $[\sin^{-1}\cos^{-1}\sin^{-1}x]=1$, where [.] denotes the greatest integer function, then x belongs to the interval

a) $[\tan\sin\cos 1, \tan\sin\cos\sin 1]$ b) $(\tan\sin\cos 1, \tan\sin\cos\sin 1)$
c) $[-1,1]$ d) $[\sin\cos\tan 1, \sin\cos\sin\tan 1]$

169. If $\sum_{i=1}^{20}\sin^{-1}x_i=10\pi$,then $\sum_{i=1}^{20}x_i$ is equal to

a) 20 b) 10 c) 0 d) None of these

170. The value of $\cos^{-1}(\cos 12)-\sin^{-1}(\sin 14)$ is

a) 2 b) $8\pi-26$ c) $4\pi+2$ d) None of these

171. If $\tan^{-1}x-\tan^{-1}y=\tan^{-1}A$, then A is equal to

a) $x-y$ b) $x+y$ c) $\frac{x-y}{1+xy}$ d) $\frac{x+y}{1-xy}$

172. If $\tan^{-1}\left(\frac{a}{x}\right)+\tan^{-1}\left(\frac{b}{x}\right)=\frac{\pi}{2}$, then x is equal to

a) $\sqrt{ab}$ b) $\sqrt{2ab}$ c) $2ab$ d) ab

173. $\tan^{-1}\frac{x}{\sqrt{a^2-x^2}}$ is equal to

a) $2\sin^{-1}\frac{x}{a}$ b) $\sin^{-1}\frac{2x}{a}$ c) $\sin^{-1}\frac{x}{a}$ d) $\cos^{-1}\frac{x}{a}$

174. If $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=\pi$, then the value of $x+y+z$ is

a) $-xyz$ b) xyz c) $\frac{1}{xyz}$ d) 0

175. If $\cos^{-1}\sqrt{p}+\cos^{-1}\sqrt{1-p}+\cos^{-1}\sqrt{1-q}=\frac{3\pi}{4}$, then the value of q is

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

176. If $0\le x\le 1$, then $\cos^{-1}(2x^2-1)$ equals

a) $2\cos^{-1}x$ b) $\pi-2\cos^{-1}x$ c) $2\pi-2\cos^{-1}x$ d) None of these

177. If $xy+yz+zx=1$, then $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=$

a) π b) $\pi/2$ c) 1 d) none of these

178. If $\cos^{-1}x>\sin^{-1}x$, then

a) $x<0$ b) $-1<x<0$ c) $0\le x<\frac{1}{\sqrt{2}}$ d) $-1\le x<\frac{1}{\sqrt{2}}$

179. If $\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)=4\tan^{-1}x$, then

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

180. The value of $\sum_{r=0}^{\infty}\tan^{-1}\left(\frac{1}{1+r+r^2}\right)$ is equal to

a) $\frac{\pi}{2}$ b) $\frac{3\pi}{4}$ c) $\frac{\pi}{4}$ d) None of these

181. The value of $\cos(2\cos^{-1}x+\sin^{-1}x)$ at $x=\frac{1}{5}$ is

a) 1 b) 3 c) 0 d) $-\frac{2\sqrt{6}}{5}$

182. If $\alpha=\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{1}{3}$ and $\beta=\cos^{-1}\frac{4}{5}+\cos^{-1}\frac{1}{3}$, then

a) $\alpha<\beta$ b) $\alpha=\beta$ c) $\alpha>\beta$ d) None of these

183. The sum of the infinite series

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)+\sin^{-1}\left(\frac{\sqrt{2}-1}{\sqrt{6}}\right)+\sin^{-1}\left(\frac{\sqrt{3}-\sqrt{2}}{\sqrt{12}}\right)+\ldots$$

$$+\ldots+\sin^{-1}\left(\frac{\sqrt{n}-\sqrt{(n-1)}}{\sqrt{\{n(n+1)\}}}\right)+\ldots \text{ is}$$

a) $\frac{\pi}{8}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) π

184. The solutions of the equation $\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}\frac{8}{31}$ are

a) $-\frac{1}{4},8$ b) $\frac{1}{4},-8$ c) $-4,\frac{1}{8}$ d) $4,-\frac{1}{8}$

185. If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=3\pi$, then $xy+yz+zx$ is equal to

a) 0 b) 1 c) 3 d) -3

186. If $-1\le x\le-\frac{1}{\sqrt{2}}$, then $\sin^{-1}\left(2x\sqrt{1-x^2}\right)$ equals

a) $2\sin^{-1}x$ b) $\pi-2\sin^{-1}x$ c) $-\pi-2\sin^{-1}x$ d) None of these

187. If $\tan\theta+\tan\left(\frac{\pi}{3}+\theta\right)+\tan\left(\frac{-\pi}{3}+\theta\right)=K\tan 3\theta$, then the value of K is

a) 1 b) 1/3 c) 3 d) none of these

188. The sum of the infinite series

$$\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)+\sin^{-1}\left(\frac{\sqrt{2}-1}{\sqrt{6}}\right)+\sin^{-1}\left(\frac{\sqrt{3}-\sqrt{2}}{\sqrt{12}}\right)+\ldots$$

$+\ldots+\sin^{-1}\left(\frac{\sqrt{n}-\sqrt{(n-1)}}{\sqrt{\{n(n+1)\}}}\right)+\ldots$ is

a) $\frac{\pi}{8}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) π

189. The number of solutions of the equation $\sin^{-1} x+\sin^{-1} 2x=\frac{\pi}{3}$, is

a) 0 b) 1 c) 2 d) Infinite

190. If the mapping $f(x)=ax+b, a>0$ maps $[-1,1]$ onto $[0,\ 2]$ then $\cot[\cot^{-1} 7+\cot^{-1} 8+\cot^{-1} 18]$ is equal to

a) $f(-1)$ b) $f(0)$ c) $f(1)$ d) $f(2)$

191. $\sin^{-1} x+\sin^{-1}\frac{1}{x}+\cos^{-1} x+\cos^{-1}\frac{1}{x}$ is equal to

a) π b) $\frac{\pi}{2}$ c) $\frac{3\pi}{2}$ d) None of these

192. If $\cos^{-1} x+\cos^{-1} y=\frac{\pi}{2}$ and $\tan^{-1} x-\tan^{-1} y=0$, then x^2+xy+y^2 is equal to

a) 0 b) $\frac{1}{\sqrt{2}}$ c) $\frac{3}{2}$ d) $\frac{1}{8}$

193. $\tan\frac{2\pi}{5}-\tan\frac{\pi}{15}-\sqrt{3}\tan\frac{2\pi}{5}\tan\frac{\pi}{15}$ is equal to

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

194. If $A=\tan^{-1}\left(\frac{x\sqrt{3}}{2k-x}\right)$ and $B=\tan^{-1}\left(\frac{2x-k}{k\sqrt{3}}\right)$,then the value of $A-B$ is

a) 10° b) 45° c) 60° d) 30°

195. If $x^2+y^2+z^2=r^2$, then

$\tan^{-1}\left(\frac{xy}{zr}\right)+\tan^{-1}\left(\frac{yz}{xr}\right)+\tan^{-1}\left(\frac{xz}{yr}\right)$ is equal to

a) π b) $\frac{\pi}{2}$ c) 0 d) None of these

196. The value of $\cos[\tan^{-1}\{\sin(\cot^{-1} x)\}]$ is

a) $\sqrt{\frac{x^2+1}{x^2-1}}$ b) $\sqrt{\frac{1-x^2}{x^2+2}}$ c) $\sqrt{\frac{1-x^2}{1+x^2}}$ d) $\sqrt{\frac{x^2+1}{x^2+2}}$

197. If $\sin^{-1} x+\sin^{-1} y+\sin^{-1} z=\frac{3\pi}{2}$ and $f(1)=2$,

$f(p+q)=f(p).f(q), \forall\, p,q\in R$, then

$x^{f(1)}+y^{f(2)}+z^{f(3)}-\frac{(x+y+z)}{x^{f(1)}+y^{f(2)}+z^{f(3)}}$ is equal to

a) 0 b) 1 c) 2 d) 3

198. If in a $\Delta\, ABC, \angle A=\tan^{-1} 2$ and $\angle B=\tan^{-1} 3$, then angle C is equal to

a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) None of these

199. If $3\sin^{-1}\frac{2x}{1+x^2}-4\cos^{-1}\frac{1+x}{1+x^2}+2\tan^{-1}\frac{2x}{1-x^2}=\frac{\pi}{3}$, then value of x is

a) $\sqrt{3}$ b) $\frac{1}{\sqrt{3}}$ c) 1 d) None of these

200. The value of $\cot\left(\operatorname{cosec}^{-1}\frac{5}{3}+\tan^{-1}\frac{2}{3}\right)$ is

a) $\frac{5}{17}$ b) $\frac{6}{17}$ c) $\frac{3}{17}$ d) $\frac{4}{17}$

201. If $\theta=\sin^{-1} x+\cos^{-1} x-\tan^{-1} x\geq 0$, then the smallest interval in which θ lies, is given by

a) $\frac{\pi}{2}\leq\theta\leq\frac{3\pi}{4}$ b) $-\frac{\pi}{4}\leq\theta\leq 0$ c) $0\leq\theta\leq\frac{\pi}{4}$ d) $\frac{\pi}{4}\leq\theta\leq\frac{\pi}{2}$

202. A solution of the equation $\tan^{-1}(1+x)+\tan^{-1}(1-x)=\frac{\pi}{2}$, is

a) $x=1$ b) $x=-1$ c) $x=0$ d) $x=\pi$

203. If $a_1, a_2, a_3, \ldots., a_n$ are in AP with common ratio d, then

$\tan\left[\tan^{-1} \frac{d}{1+a\_1a_2}+\tan^{-1} \frac{d}{1+a_2a_3}+\ldots+\tan^{-1} \frac{4}{1+a_{n-1}a_n}\right]$ is equal to

a) $\dfrac{(n-1)d}{a_1+a_n}$ b) $\dfrac{(n-1)d}{1+a_1a_n}$ c) $\dfrac{nd}{1+a_1a_n}$ d) $\dfrac{a_n-a_1}{a_n+a_1}$

204. If $\alpha=\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{1}{3}$ and $\beta=\cos^{-1}\frac{4}{5}+\cos^{-1}\frac{1}{3}$, then

a) $\alpha<\beta$ b) $\alpha=\beta$ c) $\alpha>\beta$ d) None of these

205. Sum of infinite terms of the series

$\cot^{-1}\left(1^2+\frac{3}{4}\right)+\cot^{-1}\left(2^2+\frac{3}{4}\right)+\cot^{-1}\left(3^2+\frac{3}{4}\right)+\ldots$ is

a) $\dfrac{\pi}{4}$ b) $\tan^{-1}(2)$ c) $\tan^{-1}3$ d) None of these

206. The value of x for which $\sin[\cot^{-1}(1+x)]=\cos(\tan^{-1}x)$ is

a) $\dfrac{1}{2}$ b) 1 c) 0 d) $-\dfrac{1}{2}$

207. If $\sin^{-1}\alpha+\sin^{-1}\beta+\sin^{-1}\gamma=\frac{3\pi}{2}$, then $\alpha\beta+\alpha\gamma+\beta\gamma$ is equal to

a) 1 b) 0 c) 3 d) -3

208. The sum of the infinite series

$\cot^{-1}2+\cot^{-1}8+\cot^{-1}18+\cot^{-1}32+\ldots$ is

a) π b) $\dfrac{\pi}{2}$ c) $\dfrac{\pi}{4}$ d) None of these

209. If $\cos^{-1}x>\sin^{-1}x,$ then

a) $x<0$ b) $-1<x<0$ c) $0\le x<\dfrac{1}{\sqrt{2}}$ d) $-1\le x<\dfrac{1}{\sqrt{2}}$

210. $\sec^2(\tan^{-1}2)+\mathrm{cosec}^2(\cot^{-1}3)$ is equal to

a) 1 b) 5 c) 10 d) 15

211. For the equation $\cos^{-1}x+\cos^{-1}2x+\pi=0$, then the number of real solutions is

a) 1 b) 2 c) 0 d) ∞

212. The number of real solution of $\tan^{-1}\sqrt{x(x+1)}+\sin^{-1}\sqrt{x^2+x+1}=\frac{\pi}{2}$is

a) 0 b) 1 c) 2 d) ∞

213. For the principle value branch of the graph of the function $y=\sin^{-1}x,-1\le x\le 1$, which among the following is a true statement?

a) Graph is symmetric about the x-axis b) Graph is symmetric about the y-axis

c) Graph is not continuous d) The line $x=1$ is a tangent

214. The value of $\cot\left(\mathrm{cosec}^{-1}\frac{5}{3}+\tan^{-1}\frac{2}{3}\right)$, is

a) $\dfrac{4}{17}$ b) $\dfrac{5}{17}$ c) $\dfrac{6}{17}$ d) $\dfrac{3}{17}$

215. $\sin\left(2\sin^{-1}\sqrt{\frac{63}{65}}\right)$ is equal to

a) $\dfrac{2\sqrt{126}}{65}$ b) $\dfrac{4\sqrt{65}}{65}$ c) $\dfrac{8\sqrt{63}}{65}$ d) $\dfrac{\sqrt{63}}{65}$

216. If $\tan^{-1}\frac{x-1}{x+2}+\tan^{-1}\frac{x+1}{x+2}=\frac{\pi}{4}$, then x is equal to

a) $\dfrac{1}{\sqrt{2}}$ b) $-\dfrac{1}{\sqrt{2}}$ c) $\pm\sqrt{\dfrac{5}{2}}$ d) $\pm\dfrac{1}{2}$

217. The value of $\cos[2\tan^{-1}(-7)]$ is

a) $\dfrac{49}{50}$ b) $-\dfrac{49}{50}$ c) $\dfrac{24}{25}$ d) $-\dfrac{24}{25}$

218. If $0<x<1$, then

$\sqrt{1+x^2}[\{x\cos(\cot^{-1}x)+\sin(\cot^{-1}x)\}^2-1]^{1/2}$ is equal to

a) $\frac{x}{\sqrt{1+x^2}}$ b) x c) $x\sqrt{1+x^2}$ d) $\sqrt{1+x^2}$

219. The value of $\sin(\cot^{-1} x)$ is

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

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

a) $45°$ b) $90°$ c) $15°$ d) $30°$

221. If $\frac{1}{2} \leq x \leq 1$, then $\sin^{-1}(3x - 4x^3)$ equals

a) $3\sin^{-1} x$ b) $\pi - 3\sin^{-1} x$ c) $-\pi - 3\sin^{-1} x$ d) None of these

222. $\cos^{-1}\left\{\frac{1}{2}x^2 + \sqrt{1-x^2}\sqrt{1-\frac{x^2}{4}}\right\} = \cos^{-1}\frac{x}{2} - \cos^{-1} x$ holds for

a) $|x| \leq 1$ b) $x \in R$ c) $0 \leq x \leq 1$ d) $-1 \leq x \leq 0$

223. If $\tan^{-1}\frac{1-x}{1+x} = \frac{1}{2}\tan^{-1} x$, then the value of x is

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

224. If $[\sin^{-1}\cos^{-1}\sin^{-1} x] = 1$, where [.] denotes the greatest integer function, then x belongs to the interval

a) $[\tan\sin\cos 1, \tan\sin\cos\ \sin 1]$ b) $(\tan\sin\cos 1, \tan\sin\cos\sin 1)$
c) $[-1,1]$ d) $[\sin\cos\tan 1, \sin\cos\sin\tan 1]$

225. If $\sec^{-1} x = \operatorname{cosec}^{-1} y$, then $\cos^{-1}\frac{1}{x} + \cos^{-1}\frac{1}{y} =$

a) π b) $\frac{\pi}{4}$ c) $-\frac{\pi}{2}$ d) $\frac{\pi}{2}$

226. The value of $\sin\left(4\tan^{-1}\frac{1}{3}\right) - \cos\left(2\tan^{-1}\frac{1}{7}\right)$ is

a) $\frac{3}{7}$ b) $\frac{7}{8}$ c) $\frac{8}{21}$ d) None of these

227. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\operatorname{cosec} x)$, then the value of x is

a) $\frac{3\pi}{4}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) None of these

228. The number of triplets (x, y, z)satisfying $\sin^{-1} x + \cos^{-1} y + \sin^{-1} z = 2\pi$, is

a) 0 b) 2 c) 1 d) Infinite

229. If $2\sin^{-1} x = \sin^{-1}(2x\sqrt{1-x^2})$, then x is equal to

a) $[-1,1]$ b) $\left[-\frac{1}{\sqrt{2}}, 1\right]$ c) $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$ d) None of these

230. If $\theta \in [4\pi, 5\pi]$, then $\cos^{-1}(\cos\theta)$ equals

a) $-4\pi + \theta$ b) $5\pi - \theta$ c) $4\pi - \theta$ d) $\theta - 5\pi$

231. If $[\cot^{-1} x] + [\cos^{-1} x] = 0$, where x is a non-negative real number and [.] denotes the greatest integer function, then complete set of values of x is

a) $(\cos 1, 1]$ b) $(\cot 1, 1)$ c) $(\cos 1, \cot 1)$ d) None of these

232. $\cot^{-1}(\sqrt{\cos\alpha}) - \tan^{-1}(\sqrt{\cos\alpha}) = x$, then $\sin x$ is equal to

a) $\tan^{-2}\left(\frac{\alpha}{2}\right)$ b) $\cot^2\left(\frac{\alpha}{2}\right)$ c) $\tan\alpha$ d) $\cot\left(\frac{\alpha}{2}\right)$

233. The value of $\cot^{-1} 9 + \operatorname{cosec}^{-1}\frac{\sqrt{41}}{4}$ is

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

234. $\sin\left(\frac{1}{2}\cos^{-1}\frac{4}{5}\right) =$

a) $-\frac{1}{\sqrt{10}}$ b) $\frac{1}{\sqrt{10}}$ c) $-\frac{1}{10}$ d) $\frac{1}{10}$

235. $\tan\left[\frac{\pi}{2} + \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right] + \tan\left[\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right]$ is equal to

a) $\frac{2a}{b}$ b) $\frac{2b}{a}$ c) $\frac{a}{b}$ d) $\frac{b}{a}$

236. If $\tan^{-1}\left(\frac{a}{x}\right)+\tan^{-1}\left(\frac{b}{x}\right)=\frac{\pi}{2}$,then x is equal to

a) $\sqrt{ab}$ b) $\sqrt{2ab}$ c) $2ab$ d) ab

237. If $y=\cos^{-1}(\cos 10)$, then y is equal to

a) 10 b) $4\pi-10$ c) $2\pi+10$ d) $2\pi-10$

238. If $x+y+z=xyz$, then $\tan^{-1}x+\tan^{-1}y+\tan^{-1}z=$

a) 0 b) $\pi/2$ c) 1 d) None of these

239. If $\angle A=90°$in the triangle ABC, then $\tan^{-1}\left(\frac{c}{a+b}\right)+\tan^{-1}\left(\frac{b}{a+c}\right)$ is equal to

a) 0 b) 1 c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

240. $\tan^{-1}\frac{x}{y}-\tan^{-1}\frac{x-y}{x+y}$ is equal to

(where $x<y>0$)

a) $-\frac{\pi}{4}$ b) $\frac{\pi}{4}$ c) $\frac{3\pi}{4}$ d) None of these

241. The number of real solution of $\tan^{-1}\sqrt{x(x+1)}+\sin^{-1}\ \sqrt{x^2+x+1}=\frac{\pi}{2}$is

a) 0 b) 1 c) 2 d) ∞

242. The solution set of the equation $\tan^{-1}x-\cot^{-1}x=\cos^{-1}(2-x)$is

a) [0,1] b) [−1,1] c) [1,3] d) None of these

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

a) $\frac{2}{3\sqrt{5}}$ b) $\frac{2}{3}$ c) $\frac{1}{\sqrt{5}}$ d) $\frac{4}{\sqrt{5}}$

244. $4\tan^{-1}\frac{1}{5}-\tan^{-1}\frac{1}{239}$ is equal to

a) π b) $\pi/2$ c) $\pi/3$ d) $\pi/4$

245. If $-\frac{1}{2}\leq x\leq\frac{1}{2}$, then $\cos^{-1}(4x^3-3x)$ equals

a) $3\cos^{-1}x$ b) $2\pi-3\cos^{-1}x$ c) $-2\pi-3\cos^{-1}x$ d) None of these

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

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

247. If x_1,x_2,x_3,x_4 are the roots of the equation $x^4-x^3\sin 2\beta-x\cos\beta-\sin\beta=0$, then $\tan^{-1}+\tan^{-1}x_2+\tan^{-1}x_3+\tan^{-1}x_4$ is equal to

a) β b) $\frac{\pi}{2}-\beta$ c) $\pi-\beta$ d) $-\beta$

248. If in a $\Delta\ ABC,\angle A=\tan^{-1}2$ and $\angle B=\tan^{-1}3$, then angle C is equal to

a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) None of these

249. If $\theta=\tan^{-1}a,\phi=\tan^{-1}b$ and ab=−1,then $(\theta-\phi)$ is equal to

a) 0 b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) None of these

250. If $x\in(1,\infty)$, then $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ equals

a) $2\tan^{-1}x$ b) $\pi-2\tan^{-1}x$ c) $-\pi-2\tan^{-1}x$ d) None of these

251. If $-1\leq x\leq 0$, then $\cos^{-1}(2x^2-1)$ equals

a) $2\cos^{-1}xx$ b) $\pi-2\cos^{-1}x$ c) $2\pi-2\cos^{-1}x$ d) $-2\cos^{-1}x$

252. If we consider only the principle value of the inverse trigonometric functions, then the value of $\tan\left(\cos^{-1}\frac{1}{5\sqrt{2}}-\sin^{-1}\frac{4}{\sqrt{17}}\right)$ is

a) $\sqrt{\frac{29}{3}}$ b) $\frac{29}{3}$ c) $\sqrt{\frac{3}{29}}$ d) $\frac{3}{29}$

253. Solution of the equation $\cot^{-1} x + \sin^{-1} \frac{1}{\sqrt{5}} = \frac{\pi}{4}$ is

a) $x = 3$ b) $x = \frac{1}{\sqrt{5}}$ c) $x = 0$ d) None of these

254. The principle value of $\sin^{-1} \tan\left(\frac{-5\pi}{4}\right)$ is

a) $\frac{\pi}{4}$ b) $-\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) $-\frac{\pi}{2}$

255. The value of $\sin\left[2\cos^{-1}\frac{\sqrt{5}}{3}\right]$ is

a) $\frac{\sqrt{5}}{3}$ b) $\frac{2\sqrt{5}}{3}$ c) $\frac{4\sqrt{5}}{9}$ d) $\frac{2\sqrt{5}}{9}$

256. $\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$ is equal to

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

257. If $e^{[\sin^2\alpha+\sin^4\alpha+\sin^6\alpha+\ldots\infty]\log_e 2}$ is a root of equation $x^2 - 9x + 8 = 0$,where $0<\alpha < \frac{\pi}{2}$, then the principle value of $\sin^{-1}\sin\left(\frac{2\pi}{3}\right)$ is

a) α b) 2α c) $-\alpha$ d) -2α

258. The value of $\sin[\cot^{-1}\{\cos(\tan^{-1} x)\}]$, is

a) $\sqrt{\frac{x^2+2}{x^2+1}}$ b) $\sqrt{\frac{x^2+1}{x^2+2}}$ c) $\frac{x}{\sqrt{x^2+2}}$ d) $\frac{1}{\sqrt{x^2+2}}$

259. $\tan^{-1}\sqrt{\frac{a(a+b+c)}{bc}} + \tan^{-1}\sqrt{\frac{b(a+b+c)}{ca}} + \tan^{-1}\sqrt{\frac{c(a+b+c)}{a\,b}}$, is

a) $\pi/4$ b) $\pi/2$ c) π d) 0

260. The number of positive integral solutions of the equation $\tan^{-1} x + \cos^{-1}\frac{y}{\sqrt{1+y^2}} = \sin^{-1}\frac{3}{\sqrt{10}}$ is

a) One b) Two c) Zero d) None of these

261. The value of $\cos\{\tan^{-1}(\tan 2)\}$, is

a) $\frac{1}{\sqrt{5}}$ b) $-\frac{1}{\sqrt{5}}$ c) $\cos 2$ d) $-\cos 2$

262. If $x \in [-1, 1]$, then $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ equals

a) $2\tan^{-1} x$ b) $\pi - 2\tan^{-1} x$ c) $-\pi - 2\tan^{-1} x$ d) None of these

263. If $\cos^{-1}\frac{3}{5} - \sin^{-1}\frac{4}{5} = \cos^{-1} x$, then x is equal to

a) 0 b) 1 c) -1 d) None of these

264. The number of real solutions of $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$ is

a) 0 b) 1 c) 2 d) ∞

265. $\sin^{-1}\frac{4}{5} + 2\tan^{-1}\frac{1}{3}$ is equal to

a) $\frac{\pi}{3}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) 0

266. The value of $\sin(\cot^{-1} x)$ is

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

267. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, then the value of $x^{100} + y^{100} + z^{100} - \frac{9}{x^{101}+y^{101}+z^{101}}$ is

a) 0 b) 1 c) 2 d) 3

268. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$ and $f(1) = 2$, $f(p+q) = f(p).f(q), \forall\, p, q \in R$, then

$x^{f(1)} + y^{f(2)} + z^{f(3)} - \frac{(x+y+z)}{x^{f(1)}+y^{f(2)}+z^{f(3)}}$ is equal to

a) 0 b) 1 c) 2 d) 3

269. Cos [$\tan^{-1}\{\sin(\cot^{-1} x)\}$] is equal to

a) $\sqrt{\frac{x^2+2}{x^2+3}}$ b) $\sqrt{\frac{x^2+2}{x^2+1}}$ c) $\sqrt{\frac{x^2+1}{x^2+2}}$ d) None of these

270. The value of $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$, is

a) 0 b) 1 c) π d) $-\pi$

271. $2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right)$is equal to

a) $\left(\frac{49}{29}\right)$ b) $\frac{\pi}{2}$ c) $-\left(\frac{49}{29}\right)$ d) $\frac{\pi}{4}$

272. If $\sin^{-1} a + \sin^{-1} b + \sin^{-1} c = \pi$, then the value of $a\sqrt{(1-a^2)} + b\sqrt{(1-b^2)} + c\sqrt{1-c^2)}$ will be

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

273. $4\tan^{-1}\frac{1}{5} - \tan^{-1}\frac{1}{239}$ is equal to

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

274. If $(\tan^{-1} x)^2 + (\cot^{-1} x)^2 = \frac{5\pi^2}{8}$, then x is equal to

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

275. $\frac{\alpha^3}{2}\text{cosec}^2\left(\frac{1}{2}\tan^{-1}\ \frac{\alpha}{\beta}\right) + \frac{\beta^3}{2}\sec^2\left(\frac{1}{2}\tan^{-1}\ \left(\frac{\beta}{\alpha}\right)\right)$ is

a) $(\alpha-\beta)(\alpha^2+\beta^2)$ b) $(\alpha+\beta)(\alpha^2-\beta^2)$

c) $(\alpha+\beta)(\alpha^2+\beta^2)$ d) None of these

276. If $-1 \le x \le -\frac{1}{2}$, then $\cos^{-1}(4x^3 - 3x)$ equals

a) $3\cos^{-1} x$ b) $2\pi - 3\cos^{-1} x$ c) $-2\pi + 3\cos^{-1} x$ d) None of these

277. If $a_1, a_2, a_3, \dots, a_n$ are in AP with common ratio d, then $\tan\left[\tan^{-1}\ \frac{d}{1+a\_1a_2} + \tan^{-1}\ \frac{d}{1+a_2a_3} + \dots + \tan^{-1}\ \frac{4}{1+a_{n-1}a_n}\right]$ is equal to

a) $\frac{(n-1)d}{a_1+a_n}$ b) $\frac{(n-1)d}{1+a_1a_n}$ c) $\frac{nd}{1+a_1a_n}$ d) $\frac{a_n-a_1}{a_n+a_1}$

278. If $\tan\theta + \tan\left(\frac{\pi}{3}+\theta\right) + \tan\left(-\frac{\pi}{3}+\theta\right) = a\tan 3\theta$, then a is equal to

a) 1/3 b) 1 c) 3 d) None of these

279. If $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, then the value of $\tan^{-1}\left(\frac{\tan x}{4}\right) + \tan^{-1}\left(\frac{3\sin 2x}{5+3\cos 2x}\right)$ is

a) $\frac{x}{2}$ b) $2x$ c) $3x$ d) x

280. If $\tan^{-1}\left(\frac{a}{x}\right) + \tan^{-1}\left(\frac{b}{x}\right) = \frac{\pi}{2}$,then x is equal to

a) $\sqrt{ab}$ b) $\sqrt{2ab}$ c) $2ab$ d) ab

281. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\text{ cosec } x)$, then the value of x is

a) $\frac{3\pi}{4}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) None of these

282. If $e^{[\sin^2\alpha+\sin^4\alpha+\sin^6\alpha+\dots\infty]\log_e 2}$ is a root of equation $x^2 - 9x + 8 = 0$,where $0<\alpha < \frac{\pi}{2}$, then the principle value of $\sin^{-1}\sin\left(\frac{2\pi}{3}\right)$ is

a) α b) 2α c) $-\alpha$ d) -2α

283. The solution of $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$ is

a) $\frac{1}{6}$ b) -1 c) $\left(\frac{1}{6}, -1\right)$ d) None of these

284. Which one of following is true?
a) $\sin(\cos^{-1} x) = \cos(\sin^{-1} x)$ b) $\sec(\tan^{-1} x) = \tan(\sec^{-1} x)$
c) $\cos(\tan^{-1} x) = \tan(\cos^{-1} x)$ d) $\tan(\sin^{-1} x) = \sin(\tan^{-1} x)$

285. If $a_1, a_2, a_3, \ldots a_n$ are in AP with common difference 5 and if $a_i a_j \neq -1$ for $i, j = 1, 2, \ldots, n$ then $\tan^{-1}\left(\frac{5}{1+a_1 a_2}\right) + \tan^{-1}\left(\frac{5}{1+a_2 a_3}\right) + \ldots + \tan^{-1}\left(\frac{5}{1+a_{n-1} a_n}\right)$ is equal to
a) $\tan^{-1}\left(\frac{5}{1+a_n a_{n-1}}\right)$ b) $\tan^{-1}\left(\frac{5a_1}{1+a_n a_1}\right)$ c) $\tan^{-1}\left(\frac{5n-5}{1+a_n a_1}\right)$ d) $\tan^{-1}\left(\frac{5n-5}{1+a_1 a_{n+1}}\right)$

286. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then x is
a) $\frac{1}{2}$ b) $\frac{\sqrt{3}}{2}$ c) $-\frac{1}{2}$ d) None of these

287. If $0 \leq x < \infty$, then $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ equals
a) $2\tan^{-1} x$ b) $-2\tan^{-1} x$ c) $\pi - 2\tan^{-1} x$ d) $\pi + 2\tan^{-1} x$

288. If $-1 \leq x \leq 0$, then $\cos^{-1}(2x^2 - 1)$ equals
a) $2\cos^{-1} x$ b) $\pi - 2\cos^{-1} x$ c) $2\pi - 2\cos^{-1} x$ d) $-2\cos^{-1} x$

289. If $-\infty < x \leq 0$, then $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ equals
a) $2\tan^{-1} x$ b) $-2\tan^{-1} x$ c) $\pi - 2\tan^{-1} x$ d) $\pi + 2\tan^{-1} x$

290. If $0 \leq x \leq 1$, then $\cos^{-1}(2x^2 - 1)$ equals
a) $2\cos^{-1} x$ b) $\pi - 2\cos^{-1} x$ c) $2\pi - 2\cos^{-1} x$ d) None of these

291. If $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, then $\cos^{-1} x + \cos^{-1} y$ is equal to
a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) π d) $\frac{3\pi}{4}$

292. If x takes negative permissible value, then $\sin^{-1} x$ is equal to
a) $-\cos^{-1}\sqrt{1-x^2}$ b) $\cos^{-1}\sqrt{x^2-1}$ c) $\pi - \cos^{-1}\sqrt{1-x^2}$ d) $\cos^{-1}\sqrt{1-x^2}$

293. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then $xy + yz + zx$ is equal to
a) 0 b) 1 c) 3 d) -3

294. $\sin\left[3\sin^{-1}\left(\frac{1}{5}\right)\right]$ is equal to
a) $\frac{71}{125}$ b) $\frac{74}{125}$ c) $\frac{3}{5}$ d) $\frac{1}{2}$

295. If $3\sin^{-1}\frac{2x}{1+x^2} - 4\cos^{-1}\frac{1+x}{1+x^2} + 2\tan^{-1}\frac{2x}{1-x^2} = \frac{\pi}{3}$, then value of x is
a) $\sqrt{3}$ b) $\frac{1}{\sqrt{3}}$ c) 1 d) None of these

296. If $\tan\theta + \tan\left(\frac{\pi}{3} + \theta\right) + \tan\left(-\frac{\pi}{3} + \theta\right) = a\tan 3\theta$, then a is equal to
a) $1/3$ b) 1 c) 3 d) None of these

297. If θ and ϕ are the roots of the equation $8x^2 + 22x + 5 = 0$, then
a) Both $\sin^{-1}\theta$ and $\sin^{-1}\phi$ are equal b) Both $\sec^{-1}\theta$ and $\sec^{-1}\phi$ are equal
c) Both $\tan^{-1}\theta$ and $\tan^{-1}\phi$ are equal d) None of the above

298. The sum of the infinite series
$\cot^{-1} 2 + \cot^{-1} 8 + \cot^{-1} 18 + \cot^{-1} 32 + \ldots$ is
a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) None of these

299. The relation $\tan^{-1}\left(\frac{1+x}{1-x}\right) = \frac{\pi}{4} + \tan^{-1} x$ holds true for all
a) $x \in R$ b) $x \in (-\infty, 1)$ c) $x \in (-1, \infty)$ d) $x \in (-\infty, -1)$

300. If $\sin^{-1} a + \sin^{-1} b + \sin^{-1} c = \pi$, then the value of

$a\sqrt{(1-a^2)}+b\sqrt{(1-b^2)}+c\sqrt{1-c^2)}$ will be

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

301. The sum of series
$\tan^{-1}\frac{1}{1+1+1^2}+\tan^{-1}\frac{1}{1+2+2^2}+\tan^{-1}\frac{1}{1+3+3^2}+\cdots$
∞ is equal to

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

302. $4\tan^{-1}\frac{1}{5}-\tan^{-1}\frac{1}{239}$ is equal to

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

303. Which one of the following is correct?

a) $\tan 1>\tan^{-1}1$ b) $\tan 1<\tan^{-1}1$ c) $\tan 1=\tan^{-1}1$ d) None of these

304. $5\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)+7\sin^{-1}\left(\frac{2x}{1+x^2}\right)-4\tan^{-1}\left(\frac{2x}{1-x^2}\right)-\tan^{-1}x=5\pi$, then x is equal to

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

305. If $x\in(-\infty,1)$, then $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$ equals

a) $2\tan^{-1}x$ b) $-\pi+2\tan^{-1}x$ c) $\pi+2\tan^{-1}x$ d) None of these

306. Two angles of a triangle are $\cot^{-1}2$ and $\cot^{-1}3$. Then , the third angle is

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

307. If $\theta=\sin^{-1}x+\cos^{-1}x-\tan^{-1}x, 1\le x<\infty$, then the smallest interval in which θ lies is

a) $\frac{\pi}{2}\le\theta\le\frac{3\pi}{4}$ b) $0\le\theta\le\frac{\pi}{4}$ c) $-\frac{\pi}{4}\le\theta\le 0$ d) $\frac{\pi}{4}\le\theta\le\frac{\pi}{2}$

308. If $-\frac{1}{\sqrt{3}}<x<\frac{1}{\sqrt{3}}$, then $\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$ equals

a) $3\tan^{-1}x$ b) $-\pi+3\tan^{-1}x$ c) $\pi+3\tan^{-1}x$ d) None of these