2014 Foreign

1. Write the value of $\cos^{-1}(-1/2) + 2\sin^{-1}(1/2)$ [1 mark]
2. Solve for x : $\cos(\tan^{-1}x)=\sin(\cot^{-1}3/4)$ [4 marks]
3. OR Prove that: $\cot^{-1}7 + \cot^{-1}8 + \cot^{-1}18 = \cot^{-1}3$ [4 marks]

2014 AI

4. If $\tan^{-1}x+\tan^{-1}y=\pi/4$, $xy < 1$, then write the value of $x+y+xy$. [1 mark]
5. Prove that $\tan^{-1}\dfrac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}=\dfrac{\pi}{4}-\dfrac{1}{2}\cos^{-1}x$, $-1/\sqrt{2}\le x\le 1$ [4 marks]
6. OR If $\tan^{-1}\left(\dfrac{x-2}{x-4}\right)+\tan^{-1}\left(\dfrac{x+2}{x+4}\right)=\pi/4$, find the value of x. [4 marks]

2014 Delhi

7. If $\sin(\sin^{-1}1/5+\cos^{-1}x)=1$, then find the value of x.
8. Prove that $\cot^{-1}\left[\dfrac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]=\dfrac{x}{2}$
9. OR Prove that $2\tan^{-1}\dfrac{1}{5}+\sec^{-1}\left(\dfrac{5\sqrt{2}}{7}\right)+2\tan^{-1}\left(\dfrac{1}{8}\right)=\pi/4$

2013 Foreign

10. Write the principal value of $\tan^{-1}\left(\tan\dfrac{9\pi}{8}\right)$
11. Write the value of $\sin\left(2\sin^{-1}\dfrac{3}{5}\right)$
12. Solve $\tan^{-1}\left(\dfrac{x-1}{x-2}\right)+\tan^{-1}\left(\dfrac{x+1}{x+2}\right)=\pi/4$
13. OR If $y=\cot^{-1}\left(\sqrt{\cos x}\right)-\tan^{-1}\left(\sqrt{\cos x}\right)$ then prove that $\sin y=\tan^2\dfrac{x}{2}$

2013 AI

14. Write the principal value of $\tan^{-1}\left(\sqrt{3}\right)-\cot^{-1}\left(-\sqrt{3}\right)$
15. Show that: $\tan\left(\dfrac{1}{2}\sin^{-1}\dfrac{3}{4}\right)=\dfrac{4-\sqrt{7}}{3}$
16. OR Solve the following equation: $\cos\left(\tan^{-1}x\right)=\sin\left(\cot^{-1}\dfrac{3}{4}\right)$

2013 Delhi

17. Write the principal value of $\tan^{-1}(1)+\cos^{-1}\left(-\dfrac{1}{2}\right)$.
18. Write the value of $\tan\left[2\tan^{-1}\left(\dfrac{1}{5}\right)\right]$.

19. Find the value of the following: $\tan\frac{1}{2}\left[\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\cos^{-1}\left(\frac{1-y^2}{1+y^2}\right)\right]$.

20. OR Prove that $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$

2012 Foreign

21. Write the value of cot ($\tan^{-1}a + \cot^{-1}a$)

22. Prove that $\sin^{-1}\frac{63}{65}=\cos^{-1}\frac{3}{5}+\sin^{-1}\frac{5}{13}$

23. OR Solve for x: $2\tan^{-1}(\sin x)=\tan^{-1}(2\sec x),\ x\neq\frac{\pi}{2}$

2012 Delhi

24. Write the principal value of $\cos^{-1}\left(\frac{1}{2}\right)-2\sin^{-1}\left(-\frac{1}{2}\right)$.

25. Prove that $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)=\frac{\pi}{4}-\frac{x}{2}$

26. OR Prove that $\sin^{-1}\frac{8}{17}+\sin^{-1}\frac{3}{5}=\cos^{-1}\frac{36}{85}$

2012 AI

27. Find the principal value of $\tan^{-1}\sqrt{3}-\sec^{1}(-2)$.

28. Prove that $\cos^{-1}\frac{12}{13}+\sin^{-1}\frac{3}{5}=\sin^{-1}\frac{56}{65}$

2011 AI

29. Write the principal value of $\sin^{-1}(\sin\frac{2\pi}{3})+\cos^{-1}(\cos\frac{2\pi}{3})$

30. Prove that $\tan^{-1}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}=\frac{\pi}{4}-\frac{1}{2}\cos^{-1}x,\quad -1/\sqrt{2}\le x\le 1$

2011 Delhi

31. Write the value of $\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]$

32. Prove the following: $\cot^{-1}\left[\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right]=\frac{x}{2},x\in\left(0,\frac{\pi}{4}\right)$

33. OR Find the value of $\tan^{-1}\left(\frac{x}{y}\right)-\tan^{-1}\left(\frac{x-y}{x+y}\right)$

2011 Foreign

34. Write the principal value of $\tan^{-1}(-1)$. [1 mark]

35. Prove that $\frac{9\pi}{8}-\frac{9}{4}\sin^{-1}\frac{1}{3}=\frac{9}{4}\sin^{-1}\frac{2\sqrt{2}}{3}$ [4 marks]

36. OR Solve the following equation for x: $\tan^{-1}\left(\frac{1-x}{1+x}\right)=\frac{1}{2}\tan^{-1}x\ ,\ \ x>0$ [4 marks]

2010 Foreign

37. What is the domain of the function $\sin^{-1}x$? [1 mark]

38. Prove that $\tan\left[\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right]+\tan\left[\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right]=\frac{2b}{a}$ [4 marks]

2010 Comptmnt

39. If $\tan^{-1}\left(\sqrt{3}\right)+\cot^{-1}(x)=\frac{\pi}{2}$, find x. [1 mark]

40. Prove that: $2\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{7}=\frac{\pi}{4}$ [4 marks]

41. OR Solve the for x: $\tan^{-1}\left(\frac{1-x}{1+x}\right)-\frac{1}{2}\tan^{-1}x=0\ ,\ \ x>0$ [4 marks]

2010 AI

42. (Set 1) Write the principal value of $\sec^{-1}(-2)$. [1 mark]

43. (Set 2) Write the principal value of $\cot^{-1}(-\sqrt{3})$. [1 mark]

44. (Set 3) Find the value of $\sin^{-1}(\sin\frac{4\pi}{5})$. [1 mark]

45. (Set 1 & 3) Prove that $\tan^{-1}x+\tan^{-1}\frac{2x}{1-x^2}=\tan^{-1}\frac{3x-x^3}{1-3x^2}$ [4 marks]

46. OR Prove that $\cos\left[\tan^{-1}\left\{\sin(\cot^{-1}x\right\}\right]=\sqrt{\frac{1+x^2}{2+x^2}}$ [4 marks]

47. (Set 2) Prove that $\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$ [4 marks]

48. OR Solve for x: $\tan^{-1}\left(\frac{x-1}{x-2}\right)+\tan^{-1}\left(\frac{x+1}{x+2}\right)=\frac{\pi}{4}$ [4 marks]

2010 Delhi

49. (Set 1) What is the principal value of $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$? [1 mark]

50. (Set 2) What is the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$? [1 mark]

51. (Set 3) Find the principal value of $\sin^{-1}\left(-\frac{1}{2}\right)+\cos^{-1}\left(-\frac{1}{2}\right)$. [1 mark]

52. (Set 1 & 2) Prove that $\tan^{-1}\sqrt{x}=\frac{1}{2}\cos^{-1}\frac{1-x}{1+x}\ ,\ \ x\in(0,1)$ [4 marks]

53. OR Prove that $\cos^{-1}\left(\frac{12}{13}\right) + \sin^{-1}\left(\frac{3}{5}\right) = \sin^{-1}\left(\frac{56}{65}\right)$ [4 marks]

54. (Set 3) Prove that $\tan^{-1}1 + \tan^{-1}2 + \tan^{-1}3 = \pi$ [4 marks]

55. OR If $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$, find the value of x. [4 marks]

2009 Foreign

56. Write the principal value of $\tan^{-1}(\tan\frac{3\pi}{4})$. [1 mark]

57. Prove that $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$. [4 marks]

58. OR Solve the following for x: $\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right) + \tan^{-1}\left(\frac{2x}{x^2-1}\right) = \frac{2\pi}{3}$. [4 marks]

2009 AI

59. Write the principal value of, $\cos^{-1}(\cos\frac{7\pi}{6})$. [1 mark]

60. Prove that $\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right) = \frac{x}{2}, \quad x \in \left(0, \frac{\pi}{4}\right)$ [4 marks]

61. OR Solve for x: $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$. [4 marks]

2009 Delhi

62. Using principle value, evaluate the following: $\sin^{-1}(\sin\frac{3\pi}{5})$. [1 mark]

63. Prove that $\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65} = \frac{\pi}{2}$ [4 marks]

64. OR Solve for x: $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}$ [4 marks]

2008 Foreign

65. Show that $\sin^{-1}\left(2x\sqrt{1-x^2}\right) = 2\sin^{-1}x$ [1 mark]

66. Prove that $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$ [4 marks]

67. OR Solve for x: $\tan^{-1}(x+1) + \tan^{-1}(x-1) = \tan^{-1}\left(\frac{8}{31}\right)$. [4 marks]

2008 AI

68. Solve : $\tan^{-1}\left(\frac{1-x}{1+x}\right)=\frac{1}{2}\tan^{-1}x \text{ if } x.>0$

69. Prove that $\tan\left[\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right]+\tan\left[\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right]=\frac{2b}{a}$

70. OR Solve: $\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}\left(\frac{8}{31}\right)$

2008 Delhi

71. Find the value of $\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]$ [1 mark]

72. Prove that $\tan^{-1}\frac{1}{3}+\tan^{-1}\frac{1}{5}+\tan^{-1}\frac{1}{7}+\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$ [4 marks]