CHAPTER – 2: INVERSE TRIGONOMETRIC FUNCTIONS

MARKS WEIGHTAGE – 05 marks

Previous Years Board Exam (Important Questions & Answers)

1. Evaluate : $\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]$

Ans:

$$\sin\left[\frac{\pi}{3}-\sin^{-1}\left(-\frac{1}{2}\right)\right]=\sin\left[\frac{\pi}{3}-\left(-\frac{\pi}{6}\right)\right]$$

$$=\sin\left[\frac{\pi}{3}+\frac{\pi}{6}\right]=\sin\frac{\pi}{2}=1$$

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

Ans:

$$\cot\left(\tan^{-1}a+\cot^{-1}a\right)=\cot\left(\frac{\pi}{2}-\cot^{-1}a+\cot^{-1}a\right)\ =\cot\frac{\pi}{2}=0$$

3. Find the principal values of $\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$**.**

Ans:

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

$$=\cos^{-1}\left(-\cos\frac{\pi}{6}\right)=\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)=\pi-\frac{\pi}{6}=\frac{5\pi}{6}$$

4. Find the principal values of $\tan^{-1}\left(\tan\frac{3\pi}{4}\right)$

Ans:

$$\tan^{-1}\left(\tan\frac{3\pi}{4}\right)=\tan^{-1}\left(\tan\left(\pi-\frac{\pi}{4}\right)\right)$$

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

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

Ans:

$$LHS=\tan\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\frac{a}{b}\right)+\tan\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\frac{a}{b}\right)$$

$$=\frac{\tan\frac{\pi}{4}+\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}{1-\tan\frac{\pi}{4}\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}+\frac{\tan\frac{\pi}{4}-\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}{1+\tan\frac{\pi}{4}\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}$$

$$=\frac{1+\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}{1-\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}+\frac{1-\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}{1+\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}$$

$$=\frac{\left[1+\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)\right]^2+\left[1-\tan\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)\right]^2}{\left[1-\tan^2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)\right]}$$

$$=\frac{2+2\tan^2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}{1-\tan^2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}=\frac{2\left(1+\tan^2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)\right)}{1-\tan^2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}$$

$$=\frac{2}{\cos 2\left(\frac{1}{2}\cos^{-1}\frac{a}{b}\right)}=\frac{2}{\cos\left(\cos^{-1}\frac{a}{b}\right)}=\frac{2}{\frac{a}{b}}=\frac{2b}{a}=RHS$$

6. Solve: $\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}\frac{8}{31}$

Ans:

$\tan^{-1}(x+1)+\tan^{-1}(x-1)=\tan^{-1}\frac{8}{31}$

$\Rightarrow \tan^{-1}\left(\frac{(x+1)+(x-1)}{1-(x+1).(x-1)}\right)=\tan^{-1}\frac{8}{31}$

$\Rightarrow \tan^{-1}\left(\frac{2x}{1-(x^2-1)}\right)=\tan^{-1}\frac{8}{31}\Rightarrow \tan^{-1}\left(\frac{2x}{2-x^2}\right)=\tan^{-1}\frac{8}{31}$

$\Rightarrow \frac{2x}{2-x^2}=\frac{8}{31}\Rightarrow 62x=16-8x^2\Rightarrow 8x^2+62x-16=0$

$\Rightarrow 4x^2+31x-8=0\Rightarrow (4x-1)(x+8)=0$

$\Rightarrow x=\frac{1}{4}\ \ and\ \ x=-8$

As $x = -8$ does not satisfy the equation

Hence $x=\frac{1}{4}$ is only solution.

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

Ans:

$\sin^{-1}\frac{4}{5}+\sin^{-1}\frac{5}{13}+\sin^{-1}\frac{16}{65}=\frac{\pi}{2}$

$\Rightarrow \sin^{-1}\frac{4}{5}+\sin^{-1}\frac{5}{13}=\frac{\pi}{2}-\sin^{-1}\frac{16}{65}=\cos^{-1}\frac{16}{65}$

Let $\sin^{-1}\frac{4}{5}=x$ and $\sin^{-1}\frac{5}{13}=y$

Therefore $\sin x=\frac{4}{5}$ and $\sin y=\frac{5}{13}$

Now, $\cos x=\sqrt{1-\sin^2 x}=\sqrt{1-\left(\frac{4}{5}\right)^2}=\sqrt{1-\frac{16}{25}}=\frac{3}{5}$

and $\cos y=\sqrt{1-\sin^2 y}=\sqrt{1-\left(\frac{5}{13}\right)^2}=\sqrt{1-\frac{25}{144}}=\frac{12}{13}$

We have $\cos(x+y)=\cos x\cos y-\sin x\sin y=\frac{3}{5}\times\frac{12}{13}-\frac{4}{5}\times\frac{5}{13}=\frac{36}{65}-\frac{20}{65}=\frac{16}{65}$

$$\Rightarrow x+y=\cos^{-1}\frac{16}{65}$$

$$\Rightarrow \sin^{-1}\frac{4}{5}+\sin^{-1}\frac{5}{13}=\cos^{-1}\frac{16}{65}$$

8. Prove that $\tan^{-1}\frac{1}{4}+\tan^{-1}\frac{2}{9}=\frac{1}{2}\cos^{-1}\frac{3}{5}$

Ans:

$$LHS=\tan^{-1}\frac{1}{4}+\tan^{-1}\frac{2}{9}$$

$$=\tan^{-1}\left(\frac{\frac{1}{4}+\frac{2}{9}}{1-\frac{1}{4}.\frac{2}{9}}\right)=\tan^{-1}\left(\frac{\frac{9+8}{36}}{1-\frac{2}{36}}\right)=\tan^{-1}\left(\frac{\frac{17}{36}}{\frac{34}{36}}\right) \qquad \left(\because \tan^{-1}x+\tan^{-1}y=\tan^{-1}\left(\frac{x+y}{1-x.y}\right)\right)$$

$$=\tan^{-1}\frac{17}{34}=\tan^{-1}\frac{1}{2}=\frac{1}{2}\left(2\tan^{-1}\frac{1}{2}\right)$$

$$=\frac{1}{2}\cos^{-1}\left(\frac{1-\left(\frac{1}{2}\right)^2}{1+\left(\frac{1}{2}\right)^2}\right)=\frac{1}{2}\cos^{-1}\left(\frac{1-\frac{1}{4}}{1+\frac{1}{4}}\right) \qquad \left[\because 2\tan^{-1}x=\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right]$$

$$=\frac{1}{2}\cos^{-1}\left(\frac{\frac{3}{4}}{\frac{5}{4}}\right)=\frac{1}{2}\cos^{-1}\frac{3}{5}=RHS$$

9. Solve for x: $\cos^{-1}\left(\frac{x^2-1}{x^2+1}\right)+\tan^{-1}\left(\frac{2x}{x^2-1}\right)=\frac{2\pi}{3}$

Ans:

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

$$\Rightarrow \cos^{-1}\left(\frac{-(1-x^2)}{1+x^2}\right)+\tan^{-1}\left(-\frac{2x}{1-x^2}\right)=\frac{2\pi}{3}$$

$$\Rightarrow \pi-\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)-\tan^{-1}\left(\frac{2x}{1-x^2}\right)=\frac{2\pi}{3}$$

$$\Rightarrow \pi-2\tan^{-1}x-2\tan^{-1}x=\frac{2\pi}{3}\Rightarrow \pi-4\tan^{-1}x=\frac{2\pi}{3}$$

$$\Rightarrow \pi-\frac{2\pi}{3}=4\tan^{-1}x\Rightarrow 4\tan^{-1}x=\frac{\pi}{3}\Rightarrow \tan^{-1}x=\frac{\pi}{12}$$

$$\Rightarrow \tan^{-1}x=\left(\frac{\pi}{4}-\frac{\pi}{6}\right)\Rightarrow x=\tan\left(\frac{\pi}{4}-\frac{\pi}{6}\right)=\frac{\tan\frac{\pi}{4}-\tan\frac{\pi}{6}}{1-\tan\frac{\pi}{4}.\tan\frac{\pi}{6}}$$

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

$$\Rightarrow x = \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} = \frac{3+1-2\sqrt{3}}{3-1} = \frac{4-2\sqrt{3}}{2} = 2-\sqrt{3}$$

10. Prove that $\tan^{-1}\sqrt{x} = \frac{1}{2}\cos^{-1}\left(\frac{1-x}{1+x}\right), x \in (0,1)$

Ans:

$$LHS = \tan^{-1}\sqrt{x} = \frac{1}{2}\left(2\tan^{-1}\sqrt{x}\right)$$

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

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

11. Prove that $\frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\left(\frac{1}{3}\right) = \frac{9}{4}\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)$

Ans:

$$LHS = \frac{9\pi}{8} - \frac{9}{4}\sin^{-1}\frac{1}{3} = \frac{9}{4}\left(\frac{\pi}{2} - \sin^{-1}\frac{1}{3}\right) = \frac{9}{4}\cos^{-1}\frac{1}{3}$$

$$Let \;\; \cos^{-1}\frac{1}{3} = x \Rightarrow \cos x = \frac{1}{3} \Rightarrow \sin x = \sqrt{1-\cos^2 x}$$

$$\Rightarrow \sin x = \sqrt{1-\left(\frac{1}{3}\right)^2} = \sqrt{1-\frac{1}{9}} = \sqrt{\frac{8}{9}} = \frac{2\sqrt{2}}{3}$$

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

$$\therefore \frac{9}{4}\cos^{-1}\frac{1}{3} = \frac{9}{4}\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right) = RHS$$

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

Ans:

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

$$= \tan^{-1}\left(\tan\frac{\pi}{3}\right) - \sec^{-1}\left(-\sec\frac{\pi}{3}\right)$$

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

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

13. Prove that : $\cos\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right) = \frac{6}{5\sqrt{13}}$

Ans:

Let $\sin^{-1}\frac{3}{5} = x$ and $\cot^{-1}\frac{3}{2} = y$

Then $\sin x = \frac{3}{5}$ and $\cot y = \frac{3}{2}$

Now $\cos x = \sqrt{1-\sin^2 x} = \sqrt{1-\left(\frac{3}{5}\right)^2} = \sqrt{1-\frac{9}{25}} = \sqrt{\frac{16}{25}} = \frac{4}{5}$

and $\sin y = \frac{1}{\sqrt{1+\cot^2 y}} = \frac{1}{\sqrt{1+\left(\frac{3}{2}\right)^2}} = \frac{1}{\sqrt{1+\frac{9}{4}}} = \frac{1}{\sqrt{\frac{13}{4}}} = \frac{2}{\sqrt{13}}$

$\Rightarrow \cos y = \frac{3}{\sqrt{13}}$

$LHS = \cos(x+y) = \cos x \cos y - \sin x \sin y = \frac{4}{5}\times\frac{3}{\sqrt{13}} - \frac{3}{5}\times\frac{2}{\sqrt{13}}$

$= \frac{12}{5\sqrt{13}} - \frac{6}{5\sqrt{13}} = \frac{6}{5\sqrt{13}} = RHS$

Write the value of $\tan\left(2\tan^{-1}\frac{1}{5}\right)$

Ans:

$Let\ \ 2\tan^{-1}\frac{1}{5} = x \Rightarrow \tan^{-1}\frac{1}{5} = \frac{x}{2} \Rightarrow \tan\frac{x}{2} = \frac{1}{5}$

$\tan\left(2\tan^{-1}\frac{1}{5}\right) = \tan x = \frac{2\tan\frac{x}{2}}{1-\tan^2\frac{x}{2}} = \frac{2\times\frac{1}{5}}{1-\left(\frac{1}{5}\right)^2} = \frac{2}{5}\times\frac{25}{24} = \frac{5}{12}$

14. Find the value of the following: $\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right], |x|<1, y>0\ \ and\ \ xy<1$

Ans:

$Let\ \ x = \tan\alpha\ \ and\ \ y = \tan\beta \Rightarrow \alpha = \tan^{-1}x, \beta = \tan^{-1}y$

$\tan\frac{1}{2}\left[\sin^{-1}\frac{2x}{1+x^2} + \cos^{-1}\frac{1-y^2}{1+y^2}\right]$

$= \tan\frac{1}{2}\left[\sin^{-1}\frac{2\tan\alpha}{1+\tan^2\alpha} + \cos^{-1}\frac{1-\tan^2\beta}{1+\tan^2\beta}\right]$

$= \tan\frac{1}{2}\left[\sin^{-1}(\sin 2\alpha) + \cos^{-1}(\cos 2\beta)\right]$ $\left[\because \sin 2\alpha = \frac{2\tan\alpha}{1+\tan^2\alpha}\ \ and\ \ \cos 2\beta = \frac{1-\tan^2\beta}{1+\tan^2\beta}\right]$

$= \tan\frac{1}{2}\left[2\alpha + 2\beta\right] = \tan\left[\alpha+\beta\right] = \frac{\tan\alpha + \tan\beta}{1-\tan\alpha.\tan\beta} = \frac{x+y}{1-xy}$

15. Write the value of $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$

Ans:

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

$= \tan^{-1}\left[2\sin\left(2\frac{\pi}{6}\right)\right] = \tan^{-1}\left[2\sin\left(\frac{\pi}{3}\right)\right] = \tan^{-1}\left[2\times\frac{\sqrt{3}}{2}\right]$

$= \tan^{-1}\sqrt{3} = \frac{\pi}{3}$

16. Prove that $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)=\frac{4-\sqrt{7}}{3}$

Ans:

$Let\ \ \sin^{-1}\frac{3}{4}=\alpha \Rightarrow \sin\alpha=\frac{3}{4}$

$$\Rightarrow \frac{2\tan\frac{\alpha}{2}}{1+\tan^2\frac{\alpha}{2}}=\frac{3}{4} \qquad \left[\because \sin 2\alpha=\frac{2\tan\alpha}{1+\tan^2\alpha}\right]$$

$$\Rightarrow 3+3\tan^2\frac{\alpha}{2}=8\tan\frac{\alpha}{2} \Rightarrow 3\tan^2\frac{\alpha}{2}-8\tan\frac{\alpha}{2}+3=0$$

$$\Rightarrow \tan\frac{\alpha}{2}=\frac{8\pm\sqrt{64-36}}{6}=\frac{8\pm\sqrt{28}}{6}$$

$$\Rightarrow \tan\frac{\alpha}{2}=\frac{8\pm 2\sqrt{7}}{6} \Rightarrow \tan\frac{\alpha}{2}=\frac{4\pm\sqrt{7}}{3}$$

$$\Rightarrow \tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)=\frac{4-\sqrt{7}}{3}$$

17. If $y=\cot^{-1}\left(\sqrt{\cos x}\right)-\tan^{-1}\left(\sqrt{\cos x}\right)$**, then prove that** $\sin y=\tan^2\frac{x}{2}$

Ans:

$y=\cot^{-1}\left(\sqrt{\cos x}\right)-\tan^{-1}\left(\sqrt{\cos x}\right)$

$$\Rightarrow y=\frac{\pi}{2}-\tan^{-1}\left(\sqrt{\cos x}\right)-\tan^{-1}\left(\sqrt{\cos x}\right)=\frac{\pi}{2}-2\tan^{-1}\left(\sqrt{\cos x}\right)$$

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

$$\Rightarrow y=\sin^{-1}\left(\frac{1-\cos x}{1+\cos x}\right)$$

$$\Rightarrow \sin y=\frac{1-\cos x}{1+\cos x}=\frac{2\sin^2\frac{x}{2}}{2\cos^2\frac{x}{2}}=\tan^2\frac{x}{2}$$

18. If $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right)=1$**, then find the value of x.**

Ans:

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

$$\Rightarrow \sin^{-1}\frac{1}{5}+\cos^{-1}x=\frac{\pi}{2} \Rightarrow \sin^{-1}\frac{1}{5}=\frac{\pi}{2}-\cos^{-1}x=\sin^{-1}x$$

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

19. Prove that $2\tan^{-1}\frac{1}{5}+\sec^{-1}\frac{5\sqrt{2}}{7}+2\tan^{-1}\frac{1}{8}=\frac{\pi}{4}$

Ans:

$$LHS=2\tan^{-1}\frac{1}{5}+\sec^{-1}\frac{5\sqrt{2}}{7}+2\tan^{-1}\frac{1}{8}$$

$$= 2\tan^{-1}\frac{1}{5} + 2\tan^{-1}\frac{1}{8} + \sec^{-1}\frac{5\sqrt{2}}{7} = 2\left(\tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{8}\right) + \sec^{-1}\frac{5\sqrt{2}}{7}$$

$$= 2\tan^{-1}\left(\frac{\frac{1}{5}+\frac{1}{8}}{1-\frac{1}{5}.\frac{1}{8}}\right) + \tan^{-1}\sqrt{\left(\frac{5\sqrt{2}}{7}\right)^2 - 1}$$

$$= 2\tan^{-1}\left(\frac{\frac{8+5}{40}}{1-\frac{1}{40}}\right) + \tan^{-1}\sqrt{\frac{50}{49}-1}$$

$$= 2\tan^{-1}\left(\frac{\frac{13}{40}}{\frac{39}{40}}\right) + \tan^{-1}\sqrt{\frac{1}{49}} = 2\tan^{-1}\left(\frac{13}{39}\right) + \tan^{-1}\frac{1}{7}$$

$$= 2\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\frac{1}{7} = \tan^{-1}\left(\frac{2\left(\frac{1}{3}\right)}{1-\left(\frac{1}{3}\right)^2}\right) + \tan^{-1}\frac{1}{7} \qquad \left[\because 2\tan^{-1}x = \tan^{-1}\left(\frac{2x}{1-x^2}\right)\right]$$

$$= \tan^{-1}\left(\frac{\frac{2}{3}}{1-\frac{1}{9}}\right) + \tan^{-1}\frac{1}{7} = \tan^{-1}\left(\frac{\frac{2}{3}}{\frac{8}{9}}\right) + \tan^{-1}\frac{1}{7} = \tan^{-1}\left(\frac{2}{3}\times\frac{9}{8}\right) + \tan^{-1}\frac{1}{7}$$

$$= \tan^{-1}\frac{3}{4} + \tan^{-1}\frac{1}{7} = \tan^{-1}\left(\frac{\frac{3}{4}+\frac{1}{7}}{1-\frac{3}{4}.\frac{1}{7}}\right) \qquad \left(\because \tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-x.y}\right)\right)$$

$$= \tan^{-1}\left(\frac{\frac{21+4}{28}}{1-\frac{3}{28}}\right) = \tan^{-1}\left(\frac{\frac{25}{28}}{\frac{25}{28}}\right) = \tan^{-1}1 = \frac{\pi}{4}$$

20. If $\tan^{-1}x + \tan^{-1}y = \frac{\pi}{4}$ **then write the value of** $x + y + xy$**.**

Ans:

$$\tan^{-1}x + \tan^{-1}y = \frac{\pi}{4}$$

$$\Rightarrow \tan^{-1}\left(\frac{x+y}{1-x.y}\right) = \frac{\pi}{4} \Rightarrow \frac{x+y}{1-x.y} = \tan\frac{\pi}{4} = 1$$

$$\Rightarrow x + y = 1 - xy \Rightarrow x + y + xy = 1$$