$$tg\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)=tg\left(\frac{1}{2}\left(\alpha-\frac{\pi}{4}\right)\right)$$

$$tg\frac{1}{2}\left(\alpha-\frac{\pi}{4}\right)=\frac{1-\cos\left(\alpha-\frac{\pi}{4}\right)}{\sin\left(\alpha-\frac{\pi}{4}\right)}$$

$$tg\,2x=\frac{2tgx}{1-tg^2x} \qquad x=\frac{2y}{1-y^2}$$

$$\cos 2x = 2\cos^2 x-1 \qquad \cos x=\pm\sqrt{\frac{1}{2}+\frac{1}{2}\cos 2x}$$

$$\cos 2x = 1-2\sin^2 x \qquad \sin x=\pm\sqrt{\frac{1}{2}-\frac{1}{2}\cos 2x}$$

$$tgx=\pm\sqrt{\frac{\frac{1}{2}-\frac{1}{2}\cos 2x}{\frac{1}{2}+\frac{1}{2}\cos 2x}}=\pm\sqrt{\frac{(1-\cos 2x)^2}{\sin^2 2x}}=\pm\left|\frac{1-\cos 2x}{\sin 2x}\right|$$

$$\boxed{tg\frac{1}{2}x=\frac{1-\cos x}{\sin x}}$$

$$\text{I } x\in(0,90^\circ) \Rightarrow \tfrac{1}{2}x\in(0,45^\circ)$$
$$\text{II } x\in(90^\circ,180^\circ)\ \tfrac{1}{2}x\in(45,90)$$

$$tg\frac{1}{2}x=\frac{-1\pm\sqrt{tg^2x+1}}{tgx}=\frac{-\cos x\pm 1}{\sin x}=\frac{\pm 1-\cos x}{\sin x}$$

$$\sin x+\log(1+2^{-\sin x})=\sin x\log 5+\log 6$$

$$\log 10\cdot\sin x-\sin x\log 5=\log 6-\log(1+2^{\sin x})\ /\cdot(-1)$$

$$\sin x\cdot\log\frac{1}{2}=\log\left(\frac{1+2^{\sin x}}{6}\right)$$

$$\log\left(\frac{1}{2}\right)^{\sin x}=\log\frac{1+2^{\sin x}}{6}$$

$$\left(\frac{1}{2}\right)^{\sin x}=\frac{1+2^{\sin x}}{6}$$

$$t=2^{\sin x}$$

$$6\cdot 2^{-\sin x}=1+2^{\sin x}$$

$$6\cdot\frac{1}{t}=1+t$$

$$6=t+t^2$$

$$t^2+t-6=0$$

$$(t+3)(t-2)=0$$

$$t=-3 \lor 2$$

$$2^{\sin x}\neq -3$$

$$2^{\sin x}=2 \Leftrightarrow \sin x=1 \Rightarrow x\in\left(\frac{\pi}{2}+2k\pi\right)$$

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$$\frac{1-\cos\left(\alpha-\frac{\pi}{4}\right)}{\sin\left(\alpha-\frac{\pi}{4}\right)}=\frac{1-\left(\cos\alpha\cos\frac{\pi}{4}+\sin\alpha\sin\frac{\pi}{4}\right)}{\sin\alpha\cos\frac{\pi}{4}-\sin\frac{\pi}{4}\cos\alpha}=$$

$$=\frac{1-\frac{1}{\sqrt{2}}(\cos\alpha+\sin\alpha)}{\frac{1}{\sqrt{2}}(\sin\alpha-\cos\alpha)}=\frac{\sqrt{2}-\cos\alpha-\sin\alpha}{\sin\alpha-\cos\alpha}$$

$$\sqrt{2}-\cos\alpha-\sin\alpha=-\left(\cos\alpha-\cos\frac{\pi}{4}\right)-\left(\sin\alpha-\sin\frac{\pi}{4}\right)$$

$$2\sin\left(\frac{\alpha}{2}+\frac{\pi}{8}\right)\sin\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)-2\cos\left(\frac{\alpha}{2}+\frac{\pi}{8}\right)\sin\left(\frac{\alpha}{2}-\frac{\pi}{8}\right)$$

$$2\sin\frac{\alpha}{2}-\frac{\pi}{8}\left(\sin\frac{\alpha}{2}+\frac{\pi}{8}-\cos\frac{\alpha}{2}+\frac{\pi}{8}\right)$$

$$2\sin\frac{\alpha}{2}-\frac{\pi}{8}\left(\sin\frac{\alpha}{2}+\frac{\pi}{8}\right.$$

$$\cancel{2}2\sin^2\frac{\alpha}{2}-\frac{\pi}{8}$$

$$\sin^8x+\cos^6x=1 \qquad x=\frac{k\pi}{2}$$

$$\sin^8x=1-\cos^6x=(1-\cos^2x)$$

$$a^3-b^3=(a-b)(a^2+ab+b^2)$$
$$1-\underbrace{\cos^2x}$$

$$\sin^8x=\sin^2x(\cos^4x+\cos^2x+1)$$

$$\sin^2x(\underbrace{-\sin^6x+1}_{(1-\sin^2x)(}+\cos^4x+\cos^2x)=0$$

$\sin^8 x + \cos^6 x = \sin^2 x + \cos^2 x$

$\sin^2 x(\sin^6 x - 1) = -\cos^2 x(\cos^4 x - 1)$

$\sin^2 x(\sin^3 x - 1)(\sin^3 x + 1) = -(1 - \sin^2 x)(\cos^2 x - 1)(\cos^2 x + 1)$

$\sin^2 x(\sin^2 x - 1)((\sin^2 x + 1)^2 - \sin^2 x) = (\sin^2 x - 1) \cdot \sin^2 x \cdot (\sin^2 x - 2)$

$\sin^2 x(\sin^2 x - 1)(\sin^4 x + 2\sin^2 x + 1 - \sin^2 x - \sin^2 x + 2) = 0$ $\quad k \in \mathbb{Z}$

$\sin^2 x(\sin^2 x - 1)(\sin^4 x + 3) = 0 \Leftrightarrow \sin x \in \{-1, 0, 1\} \Leftrightarrow x = \frac{k\pi}{2}$

$(1 - \cos^2 x)^4 + \cos^6 x = 1$

$\cos^8 x - 4\cos^6 x + 6\cos^4 x - 4\cos^2 + \cancel{1} + \cos^6 = \cancel{1}$

$\cos^2 x(\cos^6 x - 3\cos^4 + 6\cos^2 - 4) = 0$

$\cos^2 x(\cos^2 x - 7)(\cos^4 - 2\cos^2 + 4) = 0$

$\log_{\sin x} \cos x + \log_{\cos x} \sin x = 2$ $\quad = \frac{\log_{\sin x} \cos x}{\log_{\sin x} \sin x}$

$\sin x = a$
$\cos x = b$

$\sin x, \cos x > 0$
$x \in (2k\pi, \frac{\pi}{2} + 2k\pi)$

$2\log_{\sin x} \cos x = 2$

$\log_{\sin x} \cos x = 1$

$a^n = b$
$b^m = a$
$a^{m \cdot n} = a \Leftrightarrow a = 1 \lor m \cdot n = 1$ $\quad \notin D$

$\begin{cases} m + n = 2 \\ m \cdot n = 1 \end{cases}$

$\begin{cases} m = 2 - n \\ (2 - n) \cdot n = 1 \end{cases}$

$-n^2 + 2n - 1 = 0 \quad / \cdot -1$

$(n - 1)^2 = 0$

$n = 1 \Rightarrow m = 1$

$\sin x = \cos x \Rightarrow x = \frac{\pi}{4} + 2k\pi$

p: $\log_{\sin x} \cos x + \log_{\cos x} \sin x = 2$ $\quad x = \frac{\pi}{4} + 2k\pi$

1) I WIERSZYK. $x \in$ I ćw

2) $p + \frac{1}{p} = 2$ $\quad \log_a b \cdot \log_b a = 1$

3) $p > 0 \Rightarrow p + \frac{1}{p} \geq 2 \land \boxed{p + \frac{1}{p} = 2 \Leftrightarrow p = 1}$

$\Downarrow$

4) $p = 1 = \log_{\sin x} \cos x \Leftrightarrow \sin x = \cos x$ I ćw

$\sin x^{\log_{\sin x} \cos x} = \sin x$