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$$\lim_{x\to 1} \frac{1+\operatorname{settcosh} x}{\sqrt{4\operatorname{arctg} x+1-\pi}-1} \log\left(4^x+2^x-5\right) =$$

$$= \lim_{x\to 1} \frac{1+\operatorname{settcosh} x}{\sqrt{4\operatorname{arctg} x+1-\pi}-1} \log\left[1+\left(4^x+2^x-6\right)\right] =$$

$$= \lim_{x\to 1} \frac{1+\operatorname{settcosh} x}{\sqrt{4\operatorname{arctg} x+1-\pi}-1} \left(4^x+2^x-6\right) \underbrace{\frac{\log\left[1+\left(4^x+2^x-6\right)\right]}{4^x+2^x-6}}_{\to 1} =$$

$$= \lim_{x\to 1} \frac{1+\operatorname{settcosh} x}{\sqrt{4\operatorname{arctg} x+1-\pi}-1} \left[\left(4^x-4\right)+\left(2^x-2\right)\right]$$

$$= \lim_{x\to 1} \frac{1+\operatorname{settcosh} x}{\sqrt{4\operatorname{arctg} x+1-\pi}-1}\left[4\left(4^{x-1}-1\right)+2\left(2^{x-1}-1\right)\right]=$$

$$= \lim_{x\to 1} \frac{(1+\operatorname{settcosh} x)(x-1)}{\sqrt{4\operatorname{arctg} x+1-\pi}-1}\left[4\,\frac{4^{x-1}-1}{x-1}+2\,\frac{2^{x-1}-1}{x-1}\right]=$$

$$= \lim_{x\to 1} (1+\operatorname{settcosh} x)\cdot \frac{4\operatorname{arctg} x-\pi}{\sqrt{4\operatorname{arctg} x+1-\pi}-1}\cdot \frac{x-1}{4\operatorname{arctg} x-\pi}\left[4\log 4+2\log 2\right]=$$

$$= 2\,\frac{1}{2}\left[8\log 2+2\log 2\right] \lim_{x\to 1} \frac{(4\operatorname{arctg} x-\pi)(x-1)}{4\operatorname{arctg} x-\pi} =$$

$$= 20\log 2$$

$$\begin{cases} y = 4\operatorname{arctg} x-\pi \qquad x = \operatorname{tg}\left(\dfrac{y+\pi}{4}\right) \\ x\to 1 \qquad y\to 0 \end{cases}$$

$$\lim_{y\to 0} \frac{\operatorname{tg}\left(\frac{y}{4}+\frac{\pi}{4}\right)-1}{y} = \lim_{y\to 0} \frac{\operatorname{tg}\frac{y}{4}+\operatorname{tg}\frac{\pi}{4}-1}{1-\operatorname{tg}\frac{y}{4}\cdot\operatorname{tg}\frac{\pi}{4}}\cdot\frac{1}{y} =$$

$$= \lim_{y\to 0} \frac{1+\operatorname{tg}\frac{y}{4}}{1-\operatorname{tg}\frac{y}{4}}\cdot\frac{1}{y} = 1$$