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$$\lim_{x \rightarrow 1} \left(\frac{\sin \pi x + 3x}{x^2 + x + 1} \right)^{\frac{1}{\lg(x-1)}} =$$

$$\frac{1}{\lg(x-1)} \log \frac{\sin \pi x + 3x}{x^2 + x + 1} =$$

$$\lim_{x \rightarrow 1} e \log \left[1 + \left(\frac{\sin \pi x + 3x}{x^2 + x + 1} - 1 \right) \right] =$$

$$\lim_{x \rightarrow 1} e \frac{1}{\lg(x-1)} \cdot \frac{\sin \pi x - x^2 + 2x - 1}{x^2 + x + 1} \log \left[1 + \frac{\sin \pi x + 3x - 1}{x^2 + x + 1} \right] =$$

$$= \lim_{x \rightarrow 1} e \frac{-\pi/3}{x-1} =$$

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$$\left. \begin{array}{l} x-1 = y \\ x = y+1, x \rightarrow 1 \Rightarrow y \rightarrow 0 \end{array} \right\}$$

$$\lim_{y \rightarrow 0} \frac{1}{\lg y} \frac{\sin \pi(y+1) - (y+1)^2 + 2(y+1) - 1}{(y+1)^2 + y + 1 + 1} =$$

$$= \lim_{y \rightarrow 0} \frac{1}{\lg y} \frac{-\sin \pi y - y^2 - 1 + 2y + 2y + 2 - 1}{y^2 + 1 + 2y + y + 2} =$$

$$= \lim_{y \rightarrow 0} \frac{1}{\lg y} \frac{-\sin \pi y - y^2}{y^2 + 3y + 3} =$$

$$= \lim_{y \rightarrow 0} \frac{1}{\lg y} \frac{\left(\frac{\pi \sin \pi y}{\pi y} - y \right)}{y^2 + 3y + 3} = 1 \frac{-\pi - 0}{3}$$

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