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$$\lim_{x \to +\infty} \sqrt{x^2+3x+5} - \sqrt{x^2+x+1} =$$

$$= \lim_{x \to +\infty} \frac{\cancel{x^2} + 3x + 5 - \cancel{x^2} - x - 1}{\sqrt{x^2+3x+5} + \sqrt{x^2+x+1}} = \frac{2x+4}{\sqrt{x^2+3x+5} + \sqrt{x^2+x+1}} = 1$$

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$$\lim_{x \to +\infty} \sqrt{x^2+x+2} \log\left(1+\cos\frac{1}{\sqrt{x}}\right) - x \log 2 =$$

$$= \lim_{x \to +\infty} \sqrt{x^2+x+2} \log\left(1+\cos\frac{1}{\sqrt{x}}\right) - x \log 2 + \sqrt{x^2+x+2} \log 2 - \sqrt{x^2+x+2} \log 2 =$$

$$= \lim_{x \to +\infty} \log 2 \left(\sqrt{x^2+x+2} - x\right) + \sqrt{x^2+x+2} \log \frac{1+\cos\frac{1}{\sqrt{x}}}{2} =$$

$$= \lim_{x \to +\infty} \log 2 \cdot \frac{x+2}{\sqrt{x^2+x+2} + x} + \sqrt{x^2+x+2} \log \cos^2 \frac{1}{2\sqrt{x}} =$$

$$= \frac{1}{2} \log 2 + \lim_{x \to +\infty} \sqrt{x^2+x+2} \log\left(1 - \operatorname{sen}^2 \frac{1}{2\sqrt{x}}\right)$$

$$= \frac{1}{2} \log 2 + \lim_{x \to +\infty} \sqrt{x^2+x+2} \left(-\operatorname{sen}^2 \frac{1}{2\sqrt{x}}\right) \frac{\log\left(1 - \operatorname{sen}^2 \frac{1}{2\sqrt{x}}\right)}{-\operatorname{sen}^2 \frac{1}{\ldots}}$$

$$= \frac{1}{2}\log 2 + \lim_{x \to +\infty} -\frac{\operatorname{sen}^2 \frac{1}{2\sqrt{x}}}{\frac{1}{4x}} \frac{1}{4x} \sqrt{x^2+x+2} =$$

$$= \frac{1}{2}\log 2 - \frac{1}{4}$$