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$$\lim_{x\to+\infty} \frac{\log(3^{2x}+1)+\sqrt{\log(e^x+2)}}{3x+1+\sqrt{x}\operatorname{arctg} x} =$$

$$= \lim_{x\to+\infty} \frac{\log 3^{2x} + \log\left(1+\frac{1}{3^{2x}}\right) + \sqrt{x+\log\left(1+\frac{2}{e^x}\right)}}{x\left(3+\frac{1}{x}+\frac{\operatorname{arctg} x}{\sqrt{x}}\right)} =$$

$$= \lim_{x\to+\infty} \frac{2\log 3^x + \log\left(1+\frac{1}{3^{2x}}\right) + \sqrt{x}\sqrt{1+\frac{\log(1+2/e^x)}{x}}}{x\left(3+\frac{1}{x}+\frac{\operatorname{arctg} x}{\sqrt{x}}\right)} =$$

$$= \lim_{x\to+\infty} \frac{2\log_3 3^x \cdot \cancel{\log}}{\cancel{x}}$$

$$\log 3^x = \log_3 3^x \cdot \frac{1}{\log_3 e} = \log_3 3^x \log 3$$

$$= \lim_{x \to +\infty} \frac{2x \log 3 + \log\left(1 + \frac{1}{3^{2x}}\right) + \sqrt{x}\sqrt{1 + \frac{\log(1 + 2/e^x)}{x}}}{x\left(3 + \frac{1}{x} + \frac{\operatorname{arctg} x}{\sqrt{x}}\right)} =$$

$$= \lim_{x \to +\infty} \frac{2 \log 3 + \frac{\log\left(1 + \frac{1}{3^{2x}}\right)}{x} + \frac{1}{\sqrt{x}}\sqrt{1 + \frac{\log(1 + 2/e^x)}{x}}}{3 + \frac{1}{x} + \frac{\operatorname{arctg} x}{\sqrt{x}}} =$$

$$= \frac{2}{3} \log 3$$