8) $\lim_{x \to 0} x \operatorname{ctg} x = \lim_{x \to 0} \frac{x}{\operatorname{tg} x} =$

$= \lim_{x \to 0} \frac{\cos x}{\frac{\sin x}{x}} = 1.$

g) $\lim\limits_{x \to 0} \dfrac{\cos 5x - \cos 3x}{x^2} =$

$=$

$\cos x - \cos y = -2 \sin \dfrac{x+y}{2} \sin \dfrac{x-y}{2}$

$= \dfrac{-2 \sin 4x \sin x}{x^2} =$

$= -\dfrac{2 \sin 4x}{x} \cdot \dfrac{\sin x}{x} = -2 \cdot 4 = -8$

$\to 1$

h) $\lim\limits_{x \to 0} \sqrt[2x]{1+3x} = (1+3x)^{\frac{1}{2x} \cdot 3} =$

$y = 3x$

$= \lim\limits_{x \to 0} \left[(1+y)^{\frac{1}{y}} \right]^{3/2} = e^{3/2}$

$\to e$

11) $\lim\limits_{x \to 0} \left(\frac{3+5x}{3+2x} \right)^{\frac{1}{x}} =$

$= \left(\frac{3+2x+3x}{3+2x} \right)^{\frac{1}{x}} = \left(1 + \frac{3x}{3+2x} \right)^{\frac{1}{x}} =$

$= \left[\left(1 + \frac{3x}{3+2x} \right)^{\frac{3+2x}{3x}} \right]^{\frac{1}{x} \cdot \frac{3x}{3+2x}} = e^{\frac{1 \cdot 3x}{x \cdot (3+2x)}}$

$= \lim\limits_{x \to 0} e^{\frac{3}{3+2x}} \to 0 = e$