№ 7.3.19

$$\lim_{x\to\infty} x^2 \cdot e^{-x} = \left[\frac{\infty}{\infty}\right] = \lim_{x\to\infty} \frac{(x^2)'}{(e^x)'} = \lim_{x\to\infty} \frac{(2x)'}{(e^x)'} = \lim_{x\to\infty} \frac{2}{e^x} = \frac{2}{\infty} = 0$$

№ 7.3.20

$$\lim_{x\to 0}\left(\frac{1}{x} - \frac{1}{\sin x}\right) = [\infty - \infty] = \lim_{x\to 0} \frac{\sin x - x}{x \cdot \sin x} = \left[\frac{0}{0}\right] =$$

$$= \lim_{x\to 0} \frac{(\sin x - x)'}{(x\cdot \sin x)'} = \lim_{x\to 0} \frac{(\cos - 1)'}{(\sin x + x\cos x)'} = \lim_{x\to 0} \frac{-\sin x}{2\cos x - x\cdot \sin x} =$$

$$= \frac{0}{2\cdot 1 - 0\cdot 0} = \frac{0}{2} = 0$$

№ 7.3.21

$$\lim_{x\to\infty} x(e^{\frac{1}{x}} - 1) = [\infty \cdot 0] = \lim_{x\to\infty} \frac{e^{\frac{1}{x}} - 1}{\frac{1}{x}} = \left[\frac{0}{0}\right] = \lim_{x\to\infty} \frac{(e^{\frac{1}{x}} - 1)'}{\left(\frac{1}{x}\right)'} =$$

$$= \lim_{x\to\infty} \frac{e^{\frac{1}{x}} \cdot \left(-\frac{1}{x^2}\right)}{\left(-\frac{1}{x^2}\right)} = \lim_{x\to\infty} e^{\frac{1}{x}} = e^{\frac{1}{\infty}} = e^0 = 1$$

№ 7.3.22

$$\lim_{x\to 1}\left(\frac{1}{1-x^3} - \frac{1}{1-x^2}\right) = [\infty - \infty] = \lim_{x\to 1} \frac{(x^3 - x^2)'}{((1-x^3)(1-x^2))'} =$$

$$= \lim_{x\to 1} \frac{3x^2 - 2x}{-3x^2 + 3x^4 - 2x + 2x^4} = \lim_{x\to 1} \frac{3x^2 - 2x}{5x^4 - 3x^2 - 2x} = \frac{3-2}{5-3-2} = \frac{1}{0} = \infty$$