7.3.19 – 7.3.22 (к отчету от 11.05)

$$\lim_{x\to+\infty} x^2\cdot e^{-x} = [\infty\cdot\infty] = \lim_{x\to\infty} (x^2)'\cdot(e^{-x})'$$

$$= \lim_{x\to\infty} 2x\cdot e^{-x} = \lim_{x\to+\infty} (2x)'\cdot(e^{-x})' =$$

$$= \lim_{x\to+\infty} 2\cdot e^{-x} = 2\cdot e^{-\infty} = 2\cdot 0 = 0.$$

7.3.20.

lim

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

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

$$(x)'\cdot\sin x + x\cdot(\sin x)'$$

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

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

7.3.21

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

$$= \lim_{x\to\infty} e^{\frac{1}{x}} = e^{\frac{1}{\infty}} = 1$$

7.3.22.

$$\lim_{x\to 1}\left(\frac{1}{1-x^3}-\frac{1}{1-x^2}\right) = [0-0]$$

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

$$= \lim_{x \to 1} \frac{3x^2 - 2x}{-3x^2(1 - x^2) + 2x(1 - x^3)} = \lim_{x \to 1} \frac{3x^2 - 2x}{-3x^2 + 3x^4 - 2x + 2x^4} =$$

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