1.05

№ 7.3.11

2) $\lim\limits_{x\to 0} \frac{x^3}{x-\sin x} = [0/0] = \lim\limits_{x\to 0} \frac{(x^3)'}{(x-\sin x)'} =$

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

$= \lim\limits_{x\to 0} \frac{6x}{\sin x} = \lim\limits_{x\to 0} \frac{6}{\frac{\sin x}{x}} = \frac{6}{1} = 6$ - 1 сп.

→ замен. предел

2 сп. - $\lim\limits_{x\to 0} \frac{(6x)'}{(\sin x)'} = \frac{6}{\cos x} = \frac{6}{1} = 6$

№ 7.3.12

$\lim\limits_{x\to 2} \frac{x^3+x-10}{x^3-3x-2} = \left[\frac{0}{0}\right] = \lim\limits_{x\to 2} \frac{(x^3+x-10)'}{(x^3-3x-2)'} =$

$= \lim\limits_{x\to 2} \frac{3x^2+1}{3x^2-3} = \frac{13}{9}$

№ 7.3.13

$\lim\limits_{x\to 1} \frac{\ln x}{x-1} = \left[\frac{0}{0}\right] = \lim\limits_{x\to 1} \frac{\frac{1}{x}}{1-0} = \frac{1}{x} = \frac{1}{1} = 1$

№ 7.3.14

$\lim\limits_{x\to 0} \frac{e^x-1}{\sin x} = \lim\limits_{x\to 0} \frac{e^x}{\cos x} = \lim\limits_{x\to 0} \frac{e^0}{\cos 0} = \frac{1}{1} = 1$

№ 7.3.15

$\lim\limits_{x\to +\infty} \frac{\ln x}{x} = \left[\frac{\infty}{\infty}\right] = \frac{\ln x'}{x} = \frac{1}{x} = 0$

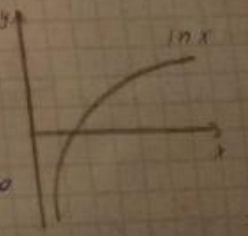
№ 7.3.16

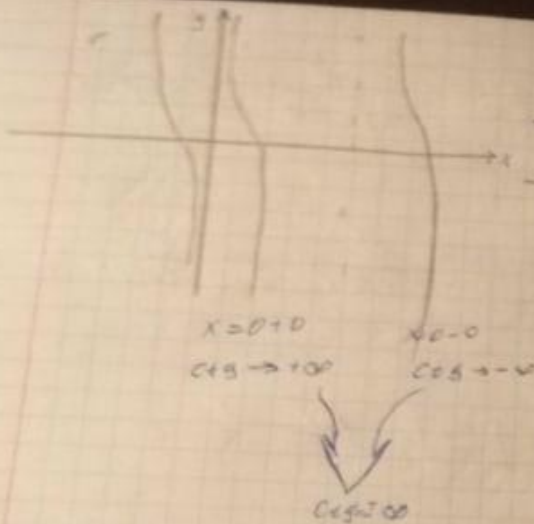
$\lim\limits_{x\to +\infty} \frac{e^x}{x^3} = \left[\frac{\infty}{\infty}\right] = \lim\limits_{x\to +\infty} \frac{(e^x)'}{(x^3)'} = \lim\limits_{x\to +\infty} \left(\frac{e^x}{3x^2}\right) =$

$= \lim\limits_{x\to +\infty} \frac{e^x}{6x} = \lim\limits_{x\to +\infty} \frac{e^x}{6} = \frac{+\infty}{6} = +\infty$

№ 7.3.17

$\lim\limits_{x\to 0} \frac{\ln x}{\operatorname{ctg} 2x} = [$





$] = [\frac{\infty}{\infty} \cdot$ [illegible] $]$

$$= \lim_{x\to 0} \frac{(\ln x)'}{(ctg 2x)'} = \lim_{x\to 0} \frac{\frac{1}{x}}{\left(-\frac{1}{\sin^2(2x)}\right)\cdot 2} =$$

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

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

$$= -\frac{1}{2} \cdot \lim_{x\to 0} \left(\underbrace{2 \cdot (\sin(2x))^{2-1}}_{\varnothing^{2\,\prime}} \cdot \underbrace{\cos 2x}_{\sin(\varnothing)'} \cdot \underbrace{2}_{2x'}\right) =$$

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

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

$$-1 \cdot \lim_{x\to 0} (\sin 4x) =$$

$$= [x \to 0; \Rightarrow 4x \to 0] = -\lim_{4x\to 0} (\sin 4x) = -0 = 0$$

№ 7.3 (?)

1) $\lim_{x\to 0+0} x \ln x = [0 \cdot (-\infty)] = \lim_{x\to 0+0} (\ln x \cdot x) = \lim_{x\to 0+0} \frac{\ln x}{\frac{1}{x}} =$

$x \to 0+0$ (т.е. $x>0$)

$$= \frac{-\infty}{\frac{1}{0}} = \frac{-\infty}{+\infty} = \left[\frac{\infty}{\infty}\right]$$

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

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

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

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

$$= \lim_{x\to 1} \frac{1 - \frac{1}{x}}{\ln x + 1 - \frac{1}{x}} = \left[\frac{0}{0}\right] = \lim_{x\to 1} \frac{\left(1 - \frac{1}{x}\right)'}{\left(\ln x + 1 - \frac{1}{x}\right)'} =$$

$$= \lim_{x\to 1} \frac{0 - \left(-\frac{1}{x^2}\right)}{\frac{1}{x} + 0 - \left(-\frac{1}{x^2}\right)} = \frac{1/x^2}{1/x + 1/x^2} = \frac{1}{2}$$

Сегодня → Форум

↘ Д.З → № 7.3.18 - 7.3.22

⇓

👁 Видеолекция (после форума)

⇓

Сверить + консп

⇓

РдР