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ИИТиПО ИВТ 1-2-3
7.7.21 Вар. 16

(4) 3) $\left(\cos(4x+5y)+\frac{x^3+x^2}{y}=5x\right)' \Leftrightarrow$

$\Leftrightarrow [(u=v)' \Rightarrow u'=v'] \Leftrightarrow$

$\Leftrightarrow \left(\cos(4x+5y)+\frac{x^3+x^2}{y}\right)'=(5x)' \Leftrightarrow$

$\Leftrightarrow \left[\begin{array}{l} 1)\ (au+bv)'=a\cdot u'+b\cdot v' \\ 2)\ (Cu)'=C\cdot u' \end{array}\right] \Leftrightarrow$

$\Leftrightarrow (\cos(4x+5y))'_x+\frac{1}{y}\cdot(x^3+x^2)'_x=5\cdot(x)'_x \Leftrightarrow$

$\Leftrightarrow \left[\begin{array}{l} 1)\ f'_x(u(x))=f'_u(u)\cdot u'_x(x) \\ 2)\ (u+v)'=u'+v' \end{array}\right] \Leftrightarrow$

$\Leftrightarrow -\sin(4x+5y)\cdot(4x+5y)'_x+\frac{1}{y}\cdot((x^3)'_x+$

$+(x^2)'_x)=5\cdot 1 \Leftrightarrow$

$\Leftrightarrow \left[\begin{array}{l} 1)\ (au+bv)'=a\cdot u'+b\cdot v' \\ 2)\ (x^n)'=n\cdot x^{n-1} \end{array}\right] \Leftrightarrow$

$\Leftrightarrow -\sin(4x+5y)(4\cdot(x)'_x+(5y)'_x)+\frac{1}{y}\cdot$

$\cdot(3\cdot x^2+2\cdot x)=5 \Leftrightarrow -\sin(4x+5y)\cdot$

$\cdot(4\cdot 1+0)+\frac{3x^2+2x}{y}=5 \Leftrightarrow$

$$\Longleftrightarrow \frac{3x^2+2x}{y} - 4\sin(4x+5y) = 5$$

(3) 2) $\lim\limits_{x\to 3} \frac{1-\sqrt{x-2}}{3-\sqrt{12-x}} = \left[\frac{0}{0}\right]$

$$\lim_{x\to 3} \frac{(1-\sqrt{x-2})(1+\sqrt{x-2})(3+\sqrt{12-x})}{(3-\sqrt{12-x})(1+\sqrt{x-2})(3+\sqrt{12-x})} =$$

$$= \lim_{x\to 3} \frac{(1^2-\sqrt{x-2}^2)(3+\sqrt{12-x})}{(3^2-\sqrt{12-x}^2)(1+\sqrt{x-2})} =$$

$$= \lim_{x\to 3} \frac{(1-x+2)(3+\sqrt{12-x})}{(9-12+x)(1+\sqrt{x-2})} =$$

$$= \lim_{x\to 3} \frac{(-x+3)(3+\sqrt{12-x})}{(-3+x)(1+\sqrt{x-2})} = \lim_{x\to 3} \frac{\cancel{(3-x)}(3+\sqrt{12-x})}{-\cancel{(3-x)}(1+\sqrt{x+2})} =$$

$$= \lim_{x\to 3} \frac{3+\sqrt{12-x}}{-1-\sqrt{x-2}} = \frac{3+\sqrt{12-3}}{-1-\sqrt{3-2}} = \frac{3+3}{-1-1} = \frac{6}{-2}$$

$$= -3$$

3) $\lim\limits_{x\to 0} \frac{\sin^3 x - tg\, x \cdot \sin^2 x}{x^3 \cdot \sin^2 x} = \left[tg\, x = \frac{\sin x}{\cos x}\right] =$

$$= \lim_{x\to 0} \frac{\sin^3 x - \frac{\sin x}{\cos x} \cdot \sin^2 x}{x^3 \cdot \sin^2 x} =$$

$$= \lim_{x\to 0} \frac{\cancel{\sin^2 x} \cdot \sin x \left(-\frac{1}{\cos x} + 1\right)}{\cancel{\sin^2 x} \cdot x^3} = \lim_{x\to 0} \frac{\sin x(\cos x - 1)}{x^3 \cos x} =$$

$$= \left[\lim_{x \to 0} \frac{\sin x}{x} = 1 \right] = \lim_{x \to 0} \frac{\cos x - 1}{x^3} =$$

1-й з. п.

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

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

4) $$\lim_{x \to \infty} \left(\frac{11 - x}{x + 7} \right)^{5x} = \left[\left(\frac{\infty}{\infty} \right)^{\infty} \right] =$$

$$= \lim_{x \to \infty} \left(\frac{\cancel{x}\left(\frac{11}{x} - 1\right)}{\cancel{x}\left(1 + \frac{7}{x}\right)} \right)^{5x} = \frac{\lim_{x \to \infty} \left(\frac{11}{x} - 1 \right)^{5x}}{\lim_{x \to \infty} \left(1 + \frac{7}{x} \right)^{5x}} =$$

$$= \left[\begin{array}{l} \text{2-ой зам. предел:} \\ \lim_{x \to \infty} \left(1 + \frac{1}{x} \right)^{x} = e \end{array} \right] =$$

$$= -1 \cdot \frac{e^{-55}}{e^{35}} = -e^{-90}$$