Пример решения задачи 19 типового расчета

$$\lim_{x\to 0}\frac{\sin 3x+\ln(1-2x)-tg\,x}{\sqrt[3]{1+3x}-\sqrt{1+2x}}$$

$$\sin 3x = 3x+\bar{o}(x^2)$$

$$\ln(1-2x) = -2x-\frac{(-2x)^2}{2}+\bar{o}(x^2) = -2x-2x^2+\bar{o}(x^2)$$

$$tg\,x = x+\bar{o}(x^2)$$

числитель = $3x-2x-x-2x^2+\bar{o}(x^2) = -2x^2+\bar{o}(x^2)$

$$\sqrt[3]{1+3x} = 1+\frac{1}{3}\cdot 3x+\frac{\frac{1}{3}\left(\frac{1}{3}-1\right)}{2!}\cdot(3x)^2+\bar{o}(x^2) = 1+x-x^2+\bar{o}(x^2)$$

$$\sqrt{1+2x} = 1+\frac{1}{2}\cdot 2x+\frac{\frac{1}{2}\left(\frac{1}{2}-1\right)}{2!}\cdot(2x)^2+\bar{o}(x^2) = 1+x-\frac{1}{2}x^2+\bar{o}(x^2) = -\frac{1}{2}x^2+\bar{o}(x^2)$$

знаменатель = $1+x-x^2-1-x+\frac{1}{2}x^2+\bar{o}(x^2) = -\frac{1}{2}x^2+\bar{o}(x^2)$

$$\lim_{x\to 0}\frac{\sin 3x+\ln(1-2x)-tg\,x}{\sqrt[3]{1+3x}-\sqrt{1+2x}} = \lim_{x\to 0}\frac{-2x^2+\bar{o}(x^2)}{-\frac{1}{2}x^2+\bar{o}(x^2)} = \lim_{x\to 0}\frac{-2+\bar{o}(1)}{-\frac{1}{2}+\bar{o}(1)} = 4$$