4 Найти предел функции:

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

$$(x-1)(x-2)(x-3)(x-4)(x-5)=\{x\neq 0\}=$$
$$=x\left(1-\frac{1}{x}\right)x\left(1-\frac{2}{x}\right)x\left(1-\frac{3}{x}\right)x\left(1-\frac{4}{x}\right)x\left(1-\frac{5}{x}\right)=$$
$$=x^5\left(1-\frac{1}{x}\right)\left(1-\frac{2}{x}\right)\left(1-\frac{3}{x}\right)\left(1-\frac{4}{x}\right)\left(1-\frac{5}{x}\right)$$

$$(2x-1)^5=\{x\neq 0\}\ x^5\left(2-\frac{1}{x}\right)$$

$$\frac{(x-1)(x-2)(x-3)(x-4)(x-5)}{(2x-1)^5}=\{x\neq 0\}$$
$$=\frac{x^5\left(1-\frac{1}{x}\right)\left(1-\frac{2}{x}\right)\left(1-\frac{3}{x}\right)\left(1-\frac{4}{x}\right)\left(1-\frac{5}{x}\right)}{x^5\left(2-\frac{1}{x}\right)^5}=$$
$$=\frac{\left(1-\frac{1}{x}\right)\left(1-\frac{2}{x}\right)\left(1-\frac{3}{x}\right)\left(1-\frac{4}{x}\right)\left(1-\frac{5}{x}\right)}{\left(2-\frac{1}{x}\right)^5}$$

$$(1)=\lim_{x\to\infty}\frac{\left(1-\frac{1}{x}\right)\left(1-\frac{2}{x}\right)\left(1-\frac{3}{x}\right)\left(1-\frac{4}{x}\right)\left(1-\frac{5}{x}\right)}{\left(2-\frac{1}{x}\right)^5}=$$
$$=\frac{\left(1-\lim\limits_{x\to\infty}\frac{1}{x}\right)\left(1-2\lim\limits_{x\to\infty}\frac{1}{x}\right)\left(1-3\lim\limits_{x\to\infty}\frac{1}{x}\right)\left(1-4\lim\limits_{x\to\infty}\frac{1}{x}\right)\left(1-5\lim\limits_{x\to\infty}\frac{1}{x}\right)}{\left(2-\lim\limits_{x\to\infty}\frac{1}{x}\right)^5}=$$
$$=\frac{(1-0)(1-2\cdot 0)(1-3\cdot 0)(1-4\cdot 0)(1-5\cdot 0)}{(2-0)^5}=\frac{1\cdot 1\cdot 1\cdot 1\cdot 1}{2^5}=\frac{1}{2^5}=\frac{1}{32}$$

Ответ:

$$\boxed{\lim_{x\to\infty}\frac{(x-1)(x-2)(x-3)(x-4)(x-5)}{(2x-1)^5}=\frac{1}{32}}$$