Annotation for the 7^{th} week

We will start with a new notion of continuity, which allows us to immediately solve limits like

$$\lim_{x\to 2}(x+4)^5, \quad \lim_{x\to 0}\frac{1}{3+x}+\sin(x-\pi), \quad \lim_{x\to -4} e^{\frac{1}{x^2}}-\sqrt[3]{x}.$$

Next, we already know how to deal with the following limit

$$\lim_{x\to+\infty}\frac{3x^3-2x+1}{x^2-2x^3+x}$$

and we will think about how to solve problems like

$$\lim_{x\to 0}\frac{x(x^2+2x+3)}{x^3+4x} \text{ or } \lim_{x\to 1}\frac{x^2+3x-4}{(x-1)^3}.$$

Finally, we know how to find an answer to

$$\lim_{x\to+\infty} x(\sqrt{x^2+1}-\sqrt{x^2-1})$$

and we will extend the method also to the following limits

$$\lim_{x\to 9}\frac{\sqrt{x-5}-\sqrt{13-x}}{\sqrt{x}-3}, \quad \lim_{x\to 1}\frac{\sqrt{2^{x-1}+1}-\sqrt{2^{x-1}+x}}{x^2-1}, \quad \lim_{x\to 0}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt[3]{1+x}-\sqrt[3]{1-x}}.$$