Lecture 8: Lecture 8 (Mon 20 Oct 2025 18:58)

The asymptote of the graph of a function – Part 1

HOMEWORK LECTURE 08:

Sentence 03:

$\lim\limits_{x\to+\infty} \frac{3x-2}{4-x} = \lim\limits_{x\to+\infty} = -3$

$\lim\limits_{x\to-\infty} \frac{3x-2}{4-x} = \lim\limits_{x\to-\infty} -3$

$\implies y = -3$ is Horizontal Asymptote of function

Sentence 04:

Domain : $2x - 1 = 0 \implies x = \frac{1}{2}$

$\lim\limits_{x\to\frac{1}{2}^+} \frac{2x+1}{2x-1} = +\infty$

$\implies x = \frac{1}{2}$ is the vertical asymptote of the graph of the function

Sentence 7:

Domain $x^2 - 3x + 2 = 0 \iff \left[\begin{array}{l} x = 2 \\ x = 1 \end{array}\right.$

$\lim\limits_{x\to2+} \frac{\sqrt{x+3}-2}{x^2-3x+2} = +\infty \implies x = 2$ is the vertical asymptote of the graph of the function

$\lim\limits_{x\to1^+} \frac{\sqrt{x+3}-2}{x^2-3x+2} = \lim\limits_{x\to1^+} \frac{\left(\sqrt{x+3}-2\right)\left(\sqrt{x+3}+2\right)}{x^2-3x+2\left(\sqrt{x+3}+2\right)} = \lim\limits_{x\to1^+} \frac{x-1}{(x-2)(x-1)\left(\sqrt{x+3}+2\right)} = \lim\limits_{x\to1^+} \frac{1}{(x-2)\left(\sqrt{x+3}+2\right)} = -\frac{1}{4} \implies$ not have vertical asymptote

Sentence 8:

We have : $\lim\limits_{x\to\infty} f(x) = 3$

$\lim\limits_{x\to\infty} -3f(x) + 11 \iff -3 \cdot \lim\limits_{x\to\infty} f(x) + 11 = -3 \cdot 3 + 11 = 2 \implies y = 2$

Sentence 9:

Domain $x^2 + x = 0 \iff \left[\begin{array}{l} x = -1 \\ x = 0 \end{array}\right.$

$\lim\limits_{x\to-1^+} \frac{\sqrt{x+9}-3}{x^2+x} = \lim\limits_{x\to-1^+} \frac{\sqrt{x+9}-3}{x(x+1)} = +\infty \implies x = -1$ is the veritical asymptote of the graph of the function.

$\lim\limits_{x\to0^+} \frac{\sqrt{x+9}-3}{x^2+x} = \lim\limits_{x\to0^+} \frac{\left(\sqrt{x+9}-3\right)\left(\sqrt{x+9}+3\right)}{x^2+x\left(\sqrt{x+9}+3\right)} = \lim\limits_{x\to0^+} \frac{x}{x(x+1)\left(\sqrt{x+9}+3\right)} = \lim\limits_{x\to0^+} \frac{1}{(x+1)\left(\sqrt{x+9}+3\right)} = \frac{1}{6} \implies$ not have the veritical asymptote of the graph of the function.