MINITEST 6. TÝDEN

A:

$$f(x) = \frac{\sqrt{4x^2+x+3}}{2x+1}$$

D_f: $4x^2+x+3 \geq 0$

$D = 1 - 4\cdot(3)\cdot 4 < 0 \rightarrow$ NEMÁ KOREŇ, $\cup \Rightarrow$ PLATÍ VŽDY

$2x+1 \neq 0$

$x \neq -\frac{1}{2} \Rightarrow D_f = \mathbb{R} \setminus \{-\frac{1}{2}\} = (-\infty; -\frac{1}{2}) \cup (-\frac{1}{2}; +\infty)$

A) $\lim\limits_{x\to+\infty} \frac{\sqrt{4x^2+x+3}}{2x+1} = \lim\limits_{x\to+\infty} \frac{|x|\sqrt{4+\frac{1}{x}+\frac{3}{x^2}}}{x(2+\frac{1}{x})} = \lim\limits_{x\to+\infty} \frac{\cancel{x}\sqrt{4+\frac{1}{x}+\frac{3}{x^2}}}{\cancel{x}(2+\frac{1}{x})} =$

$= \frac{\sqrt{4}}{2} = 1$

B) $\lim\limits_{x\to-\infty} \frac{\sqrt{4x^2+x+3}}{2x+1} = \lim\limits_{x\to-\infty} \frac{|x|\sqrt{4+\frac{1}{x}+\frac{3}{x^2}}}{x(2+\frac{1}{x})} = \lim\limits_{x\to-\infty} \frac{(-\cancel{x})\sqrt{4+\frac{1}{x}+\frac{3}{x^2}}}{\cancel{x}(2+\frac{1}{x})} =$

$= -\frac{\sqrt{4}}{2} = -1$

C) $\lim\limits_{x\to-\frac{1}{2}+} \frac{\sqrt{4x^2+x+3}}{2(x+\frac{1}{2})} = \frac{\sqrt{1+(-\frac{1}{2})+3} > 0}{0+} = +\infty$

$\Rightarrow$ E) $\lim\limits_{x\to-\frac{1}{2}} \frac{\sqrt{4x^2+x+3}}{2(x+\frac{1}{2})}$ NEEXISTUJE

D) $\lim\limits_{x\to-\frac{1}{2}-} \frac{\sqrt{4x^2+x+3}}{2(x+\frac{1}{2})} = \frac{\sqrt{1+(-\frac{1}{2})+3} > 0}{0-} = -\infty$

B:

$$f(x) = \frac{x+2}{x^2-9} = \frac{x+2}{(x-3)(x+3)}$$

$$D_f = (-\infty; -3) \cup (-3; 3) \cup (3; +\infty)$$

A) $$\lim_{x\to+\infty} \frac{x+2}{x^2-9} = \lim_{x\to+\infty} \frac{\cancel{x}(1+\frac{2}{x})}{x^{\cancel{2}}(1-\frac{9}{x^2})} = \frac{1+0}{+\infty(1-0)} = \frac{1}{+\infty} = 0$$

B) $$\lim_{x\to-\infty} \frac{x+2}{x^2-9} = \lim_{x\to-\infty} \frac{\cancel{x}(1+\frac{2}{x})}{x^{\cancel{2}}(1-\frac{9}{x^2})} = \frac{1+0}{-\infty(1-0)} = \frac{1}{-\infty} = 0$$

C) $$\lim_{x\to-3_+} \frac{x+2}{(x-3)(x+3)} = \lim_{x\to-3_+} \frac{x+2}{x-3} \cdot \lim_{x\to-3_+} \frac{1}{x+3} = \frac{-1}{-6} \cdot \frac{1}{0+} = +\infty$$

D) $$\lim_{x\to-3_-} \frac{x+2}{(x-3)(x+3)} = \lim_{x\to-3_-} \frac{x+2}{x-3} \cdot \lim_{x\to-3_-} \frac{1}{x+3} = \frac{-1}{-6} \cdot \frac{1}{0_-} = -\infty$$

E) C) $\wedge$ D) $\Rightarrow \lim_{x\to-3} \frac{x+2}{x^2-9}$ NEEXISTUJE

F) $$\lim_{x\to+3_+} \frac{x+2}{(x-3)(x+3)} = \lim_{x\to+3_+} \frac{x+2}{x+3} \cdot \lim_{x\to+3_+} \frac{1}{x-3} = \frac{5}{6} \cdot \frac{1}{0+} = +\infty$$

G) $$\lim_{x\to3_-} \frac{x+2}{(x-3)(x+3)} = \lim_{x\to3_-} \frac{x+2}{x+3} \cdot \lim_{x\to3_-} \frac{1}{x-3} = \frac{5}{6} \cdot \frac{1}{0_-} = -\infty$$

H) F) $\wedge$ G) $\Rightarrow \lim_{x\to3} \frac{x+2}{x^2-9}$ NEEXISTUJE