

$$1) \lim_{x \rightarrow -1} \frac{3x^2 - 1}{4x^2 + 5x + 2} = \frac{\lim_{x \rightarrow -1} 3x^2 - 1}{\lim_{x \rightarrow -1} (4x^2 + 5x + 2)} = \frac{3 \cdot (-1)^2 - 1}{4 \cdot (-1)^2 + 5 \cdot (-1) + 2} = \frac{2}{2} = 1$$

$$2) \lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 4} = \left[ \frac{0}{0} \right] = \lim_{x \rightarrow 2} \frac{(x-2)(x-3)}{(x-2)(x+2)} = \lim_{x \rightarrow 2} \frac{x-3}{x+2} = \frac{2-3}{2+2} = -\frac{1}{4}$$

$$3) \lim_{x \rightarrow 1} \frac{\sqrt{x+8} - 3}{x-1} = \left[ \frac{0}{0} \right] = \lim_{x \rightarrow 1} \frac{(\sqrt{x+8}-3)(\sqrt{x+8}+3)}{(x-1)(\sqrt{x+8}+3)} = \lim_{x \rightarrow 1} \frac{(x+8)-9}{(x-1)(\sqrt{x+8}+3)} = \lim_{x \rightarrow 1} \frac{x-1}{(x-1)(\sqrt{x+8}+3)} = \lim_{x \rightarrow 1} \frac{1}{\sqrt{x+8}+3} = \frac{1}{\sqrt{1+8}+3} = \frac{1}{6}$$

$$4) \lim_{x \rightarrow \infty} \frac{1+x-x^2}{2x^2+3x} = \left[ \frac{\infty}{\infty} \right] = \lim_{x \rightarrow \infty} \frac{x^2(1/x^2 + 1/x - 1)}{x^2(2 + 3/x)} = \lim_{x \rightarrow \infty} \frac{1/x^2 + 1/x - 1}{2 + 3/x} = \frac{0+0-1}{2+0} = -\frac{1}{2}$$

6.4.15

$$\lim_{x \rightarrow -2} (5x^2 + 2x - 1) = \lim_{x \rightarrow -2} (5x^2) + \lim_{x \rightarrow -2} (2x) - \lim_{x \rightarrow -2} 1 = 5 \lim_{x \rightarrow -2} x^2 + 2 \lim_{x \rightarrow -2} x - \lim_{x \rightarrow -2} 1 = 5 \cdot (-2)^2 + 2 \cdot (-2) - 1 = 15$$

6.4.16

$$\lim_{x \rightarrow 1} \frac{5x+1}{x^3-2x+3} = \frac{5 \lim_{x \rightarrow 1} x + \lim_{x \rightarrow 1} 1}{\lim_{x \rightarrow 1} x^3 - 2 \lim_{x \rightarrow 1} x + \lim_{x \rightarrow 1} 3} = \frac{5 \cdot 1 + 1}{1^3 - 2 \cdot 1 + 3} = \frac{6}{2} = 3$$

6.4.17

$$\lim_{x \rightarrow 0} \frac{x}{x^2 - x} = \left[ \frac{0}{0} \right] = \lim_{x \rightarrow 0} \frac{x \cdot 1}{x \cdot (x-1)} = \lim_{x \rightarrow 0} \frac{1}{x-1} = \frac{1}{0-1} = -1$$

6.4.18

$$\lim_{x \rightarrow 3} \frac{2^x - 8}{2^x + 8} = \frac{\lim_{x \rightarrow 3} (2^x - 8)}{\lim_{x \rightarrow 3} (2^x + 8)} = \frac{\lim_{x \rightarrow 3} 2^x - \lim_{x \rightarrow 3} 8}{\lim_{x \rightarrow 3} 2^x + \lim_{x \rightarrow 3} 8} = \frac{8 - 8}{8 + 8} = \frac{0}{16} = 0$$

6.4.19

$$\lim_{x \rightarrow 5} \frac{x^2 - 6x + 5}{x^2 - 25} = \left[ \frac{0}{0} \right] = \lim_{x \rightarrow 5} \frac{(x-5)(x-1)}{(x+5)(x-5)} = \lim_{x \rightarrow 5} \frac{x-1}{x+5} = \frac{5-1}{5+5} = \frac{4}{10} = 0,4$$

6.4.20

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{4x^3 - 3x^2 + x}{2x} &= \left[ \frac{0}{0} \right] = \lim_{x \rightarrow 0} \frac{x \cdot (4x^2 - 3x + 1)}{2x} = \lim_{x \rightarrow 0} \frac{4x^2 - 3x + 1}{2} = \\ &= \frac{1}{2} \lim_{x \rightarrow 0} (4x^2 - 3x + 1) = \frac{1}{2} (4 \cdot 0^2 - 3 \cdot 0 + 1) = \frac{1}{2} = 0,5 \end{aligned}$$

$$\begin{aligned} \lim_{x \rightarrow -1} \frac{x^3 + x + 2}{x^3 + 1} &= \left[ \frac{0}{0} \right] = \lim_{x \rightarrow -1} \frac{x^3 + x + 2}{(x+1)(x^2 - x + 1)} = \lim_{x \rightarrow -1} \frac{(x+1)(x^2 - x + 2)}{(x+1)(x^2 - x + 1)} = \\ &= \lim_{x \rightarrow -1} \frac{x^2 - x + 2}{x^2 - x + 1} = \lim_{x \rightarrow -1} \frac{(-1)^2 - (-1) + 2}{(-1)^2 - (-1) + 1} = \frac{1 + 1 + 2}{1 + 1 + 1} = 1,25 \end{aligned}$$