1) $\lim\limits_{x \to -2} \dfrac{2x^3 + 9x^2 + 12x + 4}{-x^3 - 2x^2 + 4x + 8}$

1) $\lim\limits_{x \to -2} \dfrac{2x^3 + 9x^2 + 12x + 4}{-x^3 - 2x^2 + 4x + 8} = \dfrac{2 \cdot (-2)^3 + 9 \cdot (-2)^2 + 12 \cdot (-2) + 4}{-(-2)^3 - 2(-2)^2 + 4 \cdot (-2) + 8} = \dfrac{-16 + 36 - 24 + 4}{8 - 8 - 8 + 8} = \dfrac{0}{0}$

$\lim\limits_{x \to -2} \dfrac{2x^3 + x^2 + 8x^2 + 4x + 8x + 4}{-x^2(x+2) + 4(x+2)}$

$\lim\limits_{x \to -2} \dfrac{x^2(2x+1) + 4x(2x+1) + 4(2x+1)}{-x^2(x+2) + 4(x+2)}$

$\lim\limits_{x \to -2} \dfrac{(2x+1)(x^2 + 4x + 4)}{(x+2)(x+2)(-x+2)}$

$\lim\limits_{x \to -2} \dfrac{(2x+1)\cancel{(x^2 + 4x + 4)}}{\cancel{(x^2 + 4x + 4)}(-x+2)}$

$\lim\limits_{x \to -2} \dfrac{2x+1}{-x+2} = \dfrac{2 \cdot (-2) + 1}{-(-2) + 2} = \boxed{\dfrac{-3}{4}}$

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2) $\lim\limits_{x \to -3} \dfrac{\sqrt{x^2 + 16} - 5}{x^2 + 3x}$

2) $\lim\limits_{x \to -3} \dfrac{\sqrt{x^2 + 16} - 5}{x^2 + 3x} = \dfrac{\sqrt{(-3)^2 + 16} + 5}{(-3)^2 + 3 \cdot (-3)} = \dfrac{5 - 5}{9 - 9} = \dfrac{0}{0}$

$\lim\limits_{x \to -3} \dfrac{\sqrt{x^2 + 16} - 5}{x^2 + 3x} \cdot \dfrac{\sqrt{x^2 + 16} + 5}{\sqrt{x^2 + 16} + 5}$

$\lim\limits_{x \to -3} \dfrac{x^2 + 16 - 25}{(x^2 + 3x)(\sqrt{x^2 + 16} + 5)}$

$\lim\limits_{x \to -3} \dfrac{\cancel{(x+3)}(x-3)}{x\cancel{(x+3)}(\sqrt{x^2 + 16} + 5)} = \lim\limits_{x \to -3} \dfrac{x-3}{x(\sqrt{x^2 + 16} + 5)} = \dfrac{-6}{-30} = \dfrac{1}{5}$

$$\lim_{h \to 0} \frac{(t+h)^2 - t^2}{h}$$

1) $\displaystyle\lim_{h \to 0} \frac{t^2 + 2th + h^2 - t^2}{h}$

$\displaystyle\lim_{h \to 0} \frac{h(2t + h)}{h}$

$\displaystyle\lim_{h \to 0} 2t + h = 2t$

2. $\displaystyle\lim_{h \to 0} \frac{(t+h)^3 - t^3}{h}$ $(t^2 + 2ht + h^2)(t+h)$

$t^3 + ht^2 + 2ht^2 + 2h^2t + h^2t + h^3$

$\displaystyle\lim_{h \to 0} \frac{t^3 + 3ht^2 + 3h^2t + h^3 - t^3}{h}$

$\displaystyle\lim_{h \to 0} \frac{h(3t^2 + 3ht + h^2)}{h}$

$\displaystyle\lim_{h \to 0} 3t^2 + 3ht + h^2 = 3t^2$

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3. Seja $f(x) = (x^2 + x - 2)/(x^2 - x)$, calcule:

$$\lim_{x \to -1} f(x) \quad \text{e} \quad \lim_{x \to 1} f(x).$$

3) $\displaystyle\lim_{x \to -1} \frac{x^2 + x - 2}{x^2 - x} = \frac{(-1)^2 - 1 - 2}{(-1)^2 - (-1)} = \frac{-2}{2} = -1$

$\displaystyle\lim_{x \to 1} \frac{x^2 + x - 2}{x^2 - x} = \frac{0}{0}$

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

$\displaystyle\lim_{x \to 1} \frac{x(x-1) + 2(x-1)}{x(x-1)}$

$\displaystyle\lim_{x \to 1} \frac{(x+2)(x-1)}{x(x-1)}$

$\displaystyle\lim_{x \to 1} \frac{x+2}{x} = \frac{1+2}{1} = 3$

4. $\lim\limits_{x \to -1} \frac{x^2+3x+2}{x^2-x-2}$.

5. $\lim\limits_{x \to 3} \frac{x^3-2x^2-2x-3}{2x^2-4x-6}$.

4) $\lim\limits_{x \to -1} \dfrac{x^2+3x+2}{x^2-x-2}$

$\lim\limits_{x \to -1} \dfrac{x^2+x+2x+2}{x^2+x-2x-2}$

$\lim\limits_{x \to -1} \dfrac{x(x+1)+2(x+1)}{x(x+1)-2(x+1)}$

$\lim\limits_{x \to -1} \dfrac{(x+2)(x+1)}{(x-2)(x+1)}$

$\lim\limits_{x \to -1} \dfrac{x+2}{x-2} = \dfrac{-1+2}{-1-2} = \dfrac{1}{-3} = -\dfrac{1}{3}$

5) $\lim\limits_{x \to 3} \dfrac{x^3-2x^2-2x-3}{2x^2-4x-6} = \dfrac{27-18-6-3}{18-12-6} = \dfrac{0}{0}$

$\lim\limits_{x \to 3} \dfrac{x^3-3x^2+x^2-3x+x-3}{x^2-3x+x^2-3x+2x-6}$

$\lim\limits_{x \to 3} \dfrac{x^2(x-3)+x(x-3)+1(x-3)}{x(x-3)+x(x-3)+2(x-3)}$

$\lim\limits_{x \to 3} \dfrac{(x-3)(x^2+x+1)}{(x-3)(2x+2)}$

$\lim\limits_{x \to 3} \dfrac{x^2+x+1}{2x+2} = \dfrac{(3)^2+3+1}{2(3)+2} = \dfrac{9+3+1}{6+2} = \dfrac{13}{8}$