

$$2) \lim_{x \rightarrow 1} \frac{\sqrt[3]{x} - 1}{\sqrt[3]{x^2} + 2\sqrt[3]{x} - 3} = \left| \frac{0}{0} \right| = \lim_{x \rightarrow 1} \frac{(\sqrt[3]{x} - 1)'}{(\sqrt[3]{x^2} + 2\sqrt[3]{x} - 3)'} =$$

$$= \lim_{x \rightarrow 1} \frac{\frac{1}{3} \cdot \frac{1}{\sqrt[3]{x^2}}}{\frac{2}{3} \frac{1}{\sqrt[3]{x}} + \frac{2}{3} \frac{1}{\sqrt[3]{x^2}}} = \frac{1 \cdot 1}{2(1+1)} = \frac{1}{4}$$

$$4) \lim_{x \rightarrow 5} \frac{x-5}{\sqrt{x+4}-3} = \left| \frac{0}{0} \right| = \lim_{x \rightarrow 5} \frac{(x-5)'}{(\sqrt{x+4}-3)'} = \lim_{x \rightarrow 5} \frac{1}{\frac{1}{2} \cdot \frac{1}{\sqrt{x+4}}} =$$

$$= \lim_{x \rightarrow 5} (2\sqrt{x+4}) = 2\sqrt{9} = 2 \cdot 3 = 6$$

$$3) \lim_{x \rightarrow \infty} (\sqrt{x^2+3x} - \sqrt{x^2+4x}) = \left| \infty - \infty \right| =$$

$$= \lim_{x \rightarrow \infty} \sqrt{x} (\sqrt{x+3} - \sqrt{x+4}) = \lim_{x \rightarrow \infty} \frac{\sqrt{x} (\sqrt{x+3} - \sqrt{x+4})(\sqrt{x+3} + \sqrt{x+4})}{\sqrt{x+3} + \sqrt{x+4}} =$$

$$= \lim_{x \rightarrow \infty} \frac{\sqrt{x} (x+3-x-4)}{\sqrt{x+3} + \sqrt{x+4}} = - \lim_{x \rightarrow \infty} \frac{\sqrt{x}}{\sqrt{x+3} + \sqrt{x+4}} = \left| \frac{\infty}{\infty} \right| =$$

$$= - \lim_{x \rightarrow \infty} \frac{(\sqrt{x})'}{(\sqrt{x+3} + \sqrt{x+4})'} = - \lim_{x \rightarrow \infty} \frac{\frac{1}{2} \cdot \frac{1}{\sqrt{x}}}{\frac{1}{2} \frac{1}{\sqrt{x+3}} + \frac{1}{2} \frac{1}{\sqrt{x+4}}} =$$

$$= - \lim_{x \rightarrow \infty} \frac{\sqrt{x+3} \sqrt{x+4}}{\sqrt{x} (\sqrt{x+4} + \sqrt{x+3})} = - \lim_{x \rightarrow \infty} \sqrt{\frac{x+3}{x}} \cdot \lim_{x \rightarrow \infty} \frac{\sqrt{x+4}}{\sqrt{x+4} + \sqrt{x+3}} =$$

$$= - \lim_{x \rightarrow \infty} \sqrt{1+\frac{3}{x}} \cdot \lim_{x \rightarrow \infty} \frac{(\sqrt{x+4})'}{(\sqrt{x+4} + \sqrt{x+3})'} = \left| \lim_{x \rightarrow \infty} \sqrt{1+\frac{3}{x}} = 1+0=1 \right| =$$

$$= - \lim_{x \rightarrow \infty} \frac{\frac{1}{2} \frac{1}{\sqrt{x+4}}}{\frac{1}{2} \frac{1}{\sqrt{x+4}} + \frac{1}{2} \frac{1}{\sqrt{x+3}}} = - \lim_{x \rightarrow \infty} \frac{(\sqrt{x+4} \sqrt{x+3})'}{(\sqrt{x+4} \cdot \sqrt{x+3} + x+4)'} =$$

$$= - \lim_{x \rightarrow \infty} \frac{\frac{1}{2} \sqrt{\frac{x+3}{x+4}} + \frac{1}{2} \sqrt{\frac{x+4}{x+3}}}{\frac{1}{2} \sqrt{\frac{x+3}{x+4}} + \frac{1}{2} \sqrt{\frac{x+4}{x+3}} + 1} = - \frac{\sqrt{\lim_{x \rightarrow \infty} \frac{(x+3)'}{(x+4)'}} + \sqrt{\lim_{x \rightarrow \infty} \frac{(x+4)'}{(x+3)'}}}{\sqrt{\lim_{x \rightarrow \infty} \frac{(x+3)'}{(x+4)'}} + \sqrt{\lim_{x \rightarrow \infty} \frac{(x+4)'}{(x+3)'}} + 2} =$$

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

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