

$$1. \lim_{x \rightarrow \infty} \frac{x+1}{x-1}$$

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$$\lim_{x \rightarrow \infty} \frac{x+1}{x-1} \cdot \frac{\frac{1}{x}}{\frac{1}{x}}$$

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$$\lim_{x \rightarrow \infty} \frac{(x+1) \frac{1}{x}}{(x-1) \frac{1}{x}}$$

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$$\lim_{x \rightarrow \infty} \frac{\frac{1}{x}(x) + \frac{1}{x}(1)}{\frac{1}{x}(x) - \frac{1}{x}(1)}$$

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$$\lim_{x \rightarrow \infty} \frac{1 + \frac{1}{x}}{1 - \frac{1}{x}}$$

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$$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x} \right)$$

$$\lim_{x \rightarrow \infty} \left(1 - \frac{1}{x} \right)$$

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$$\lim_{x \rightarrow \infty} 1 + \lim_{x \rightarrow \infty} \frac{1}{x} \rightarrow \lim_{x \rightarrow \infty} \frac{1}{x} = 0$$

$$\lim_{x \rightarrow \infty} 1 - \lim_{x \rightarrow \infty} \frac{1}{x}$$

$$\frac{1 + 0}{1 - 0}$$

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$$\frac{1}{1}$$

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$$\frac{1}{1}$$

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$$\lim_{x \rightarrow \infty} \frac{x+1}{x-1} = 1$$

$$2. \lim_{x \rightarrow \infty} \frac{4x^2 + 1}{2x^2 + x - 1}$$

$$\lim_{x \rightarrow \infty} \frac{4x^2 + 1}{2x^2 + x - 1} \cdot \frac{\frac{1}{x^2}}{\frac{1}{x^2}}$$

$$\lim_{x \rightarrow \infty} \frac{\left(\frac{1}{x^2}\right) 4x^2 + \left(\frac{1}{x^2}\right) 1}{\left(\frac{1}{x^2}\right) 2x^2 + \left(\frac{1}{x^2}\right) x - \left(\frac{1}{x^2}\right) 1}$$

$$\lim_{x \rightarrow \infty} \frac{\frac{4x^2}{x^2} + \frac{1}{x^2}}{\frac{2x^2}{x^2} + \frac{x}{x^2} - \frac{1}{x^2}} \rightarrow \frac{x^{-1}}{x^2} = x^{-1-2} = x^{-3} = \frac{1}{x^3}$$

$$\lim_{x \rightarrow \infty} \frac{4 + \frac{1}{x^2}}{2 + \frac{1}{x} - \frac{1}{x^2}}$$

$$\lim_{x \rightarrow \infty} \left(4 + \frac{1}{x^2}\right)$$

$$\lim_{x \rightarrow \infty} \left(2 - \frac{1}{x} - \frac{1}{x^2}\right)$$

$$\lim_{x \rightarrow \infty} 4 + \lim_{x \rightarrow \infty} \frac{1}{x^2} \rightarrow \lim_{x \rightarrow \infty} \frac{1}{x^3} = 0$$

$$\lim_{x \rightarrow \infty} 2 + \lim_{x \rightarrow \infty} \frac{1}{x} - \lim_{x \rightarrow \infty} \frac{1}{x^2}$$

$$\frac{4}{2} + \frac{0}{0 - 0}$$

$$\frac{4}{2}$$

$$\textcircled{2}$$

$$\lim_{x \rightarrow \infty} \frac{4x^2 + 1}{2x^2 + x - 1} = 2$$

$$3. \lim_{x \rightarrow \infty} \frac{\sqrt{2x^2+1}}{x-1}$$

$$\lim_{x \rightarrow \infty} \frac{\sqrt{2x^2+1}}{x-1} \cdot \frac{\frac{1}{x}}{\frac{1}{x}}$$

$$\lim_{x \rightarrow \infty} \frac{(\sqrt{2x^2+1}) \cdot \frac{1}{x}}{(x-1) \cdot \frac{1}{x}}$$

$$\lim_{x \rightarrow \infty} \frac{\sqrt{2} + \frac{1}{x}}{1 - \frac{1}{x}}$$

$$\lim_{x \rightarrow \infty} \sqrt{2} + \lim_{x \rightarrow \infty} \frac{1}{x}$$

$$\lim_{x \rightarrow \infty} 1 - \lim_{x \rightarrow \infty} \frac{1}{x} \rightarrow \lim_{x \rightarrow \infty} \frac{1}{x} = 0$$

$$\frac{\sqrt{2} + 0}{1 - 0}$$

$$1 - 0$$

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

$$\sqrt{2}$$

$$\lim_{x \rightarrow \infty} \frac{\sqrt{2x^2+1}}{x-1} = \sqrt{2}$$

$$\frac{1}{x} \cdot \sqrt{2x^2+1}$$

$$\frac{1}{x} \cdot \frac{\sqrt{2x^2}}{1} + \frac{1}{x} \cdot \frac{\sqrt{1}}{1}$$

$$\frac{\sqrt{2x^2}}{x} + \frac{\sqrt{1}}{x}$$

$$\frac{\sqrt{2} \cdot \sqrt{x^2}}{x} + \frac{1}{x}$$

$$\frac{\sqrt{2} \cdot x}{x} + \frac{1}{x}$$

$$\sqrt{2} + \frac{1}{x}$$

$$\frac{1}{x} (x-1)$$

$$\frac{1}{x} (x) - \frac{1}{x} (1)$$

$$\frac{x}{x} - \frac{1}{x}$$

$$1 - \frac{1}{x}$$

$$4. \lim_{x \rightarrow -\infty} \frac{\sqrt{2x^2 + 1}}{x}$$

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{2x^2 + 1}}{x} \cdot \frac{\frac{1}{x}}{\frac{1}{x}}$$

$$\lim_{x \rightarrow -\infty} \frac{(\sqrt{2x^2 + 1})}{x} \cdot \frac{1}{x}$$

$$\lim_{x \rightarrow -\infty} \frac{-\sqrt{2} - \frac{1}{x}}{1}$$

$$\lim_{x \rightarrow -\infty} -\sqrt{2} - \lim_{x \rightarrow -\infty} \left(\frac{1}{x} \right) \Rightarrow \lim_{x \rightarrow -\infty} \frac{1}{x} = 0$$

$$\lim_{x \rightarrow -\infty} 1$$

$$-\sqrt{2} - 0$$

$$-\sqrt{2}$$

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{2x^2 + 1}}{x} = -\sqrt{2}$$

$$\left(\frac{-1}{x} \right) \cdot \sqrt{2x^2} \cdot \left(\frac{1}{x} \right) \cdot \sqrt{1}$$

$$= \frac{-\sqrt{2x^2}}{x} + \frac{-\sqrt{1}}{x}$$

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

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

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

$$x \cdot \frac{1}{x}$$

$$\frac{x}{x} = 1$$

$\frac{1}{x} (-1) \rightarrow$ multiply by
-1 since
we are going
to $-\infty$

$$5. \lim_{x \rightarrow \infty} \frac{\sqrt{x}}{x}$$

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$$\lim_{x \rightarrow \infty} \frac{\sqrt{x}}{x} \cdot \frac{\sqrt{x}}{\sqrt{x}}$$

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$$\left(\lim_{x \rightarrow \infty} \frac{1}{x^{1/2}} \right) \lim_{x \rightarrow \infty} \frac{1}{x^r} = 0$$

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$$\boxed{\lim_{x \rightarrow \infty} \frac{\sqrt{x}}{x} = 0}$$

$$\begin{aligned} & \frac{\sqrt{x}}{x} \cdot \frac{\sqrt{x}}{\sqrt{x}} \\ & || \\ & \frac{\sqrt{x^2}}{x\sqrt{x}} \\ & || \\ & \frac{x}{x\sqrt{x}} \\ & || \\ & \boxed{\frac{1}{\sqrt{x}}} \end{aligned}$$

or $\boxed{\frac{1}{x^{1/2}}}$