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05 – Limits Algebraically

Strategy: Computing Limits Algebraically

Suppose you want to compute $\lim_{x\to a} \dfrac{f(x)}{g(x)}$. Try plugging in a for x.

- $\boxed{\dfrac{0}{0}}$ Try to "simplify" (factor/cancel, clear denominators, multiply by conjugate, etc.).
- $\boxed{\dfrac{\text{NOT } 0}{0}}$ Compute the one-sided limits first. They should be $\pm\infty$.

1. Compute the following limits without graphing.

(a) $\lim_{x\to -1} \dfrac{2x^2+3x+1}{x^2-2x-3}$

(b) $\lim_{x\to 1^+} \dfrac{2-x}{1-x}$

(c) $\lim_{x\to 0} \dfrac{x^2+2x}{x^3+3x^2}$

(d) $\lim_{x \to 3} \frac{\frac{1}{x} - \frac{1}{3}}{x - 3}$

(e) $\lim_{h \to 0} \frac{(-3 + h)^2 - 9}{h}$

(f) $\lim_{x \to 16} \frac{4 - \sqrt{x}}{16x - x^2}$