Calculus I
Computing limits with direct substitution

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Example (Limit with Direct Substitution)

$$\text{Find} \quad \lim_{x \to 3} \frac{x+2}{\sqrt{x-1}(x+1)^2}$$

$$\text{Plug in 3:} \quad \frac{(3)+2}{\sqrt{(3)-1}((3)+1)^2} = \frac{5}{16\sqrt{2}}$$

$$\text{Therefore} \quad \lim_{x \to 3} \frac{x+2}{\sqrt{x-1}(x+1)^2} = \frac{5}{16\sqrt{2}}.$$

Example (Limit in Which Direct Substitution Doesn't Work)

$$\text{Find} \quad \lim_{x \to 3} \frac{x^3 - 3x^2 + x - 3}{x^2 - 7x + 12}$$

$$\text{Plug in 3:} \quad \frac{(3)^3 - 3(3)^2 + (3) - 3}{(3)^2 - 7(3) + 12} = \frac{0}{0}$$

Zero over zero is undefined, so we can't use direct substitution.