Calculus I
Type 1: Quotient of quadratics.

Todor Milev

2019

Example (Limit with Factoring)

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

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

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

$$\text{Factor:} \quad \lim_{x\to 3} \frac{x^3-3x^2+x-3}{x^2-7x+12} = \lim_{x\to 3} \frac{\qquad\qquad\qquad}{\qquad\qquad\qquad}$$

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

$$\text{Plug in 3:} \quad \lim_{x\to 3} \frac{x^3-3x^2+x-3}{x^2-7x+12} = \frac{(3)^2+1}{(3)-4}$$

$$= \frac{10}{-1}$$

$$= -10.$$