1. Evaluate the limit

$$\lim_{x\to 3} \frac{x^2+x-12}{x^2-9}$$

Solution: $\lim\limits_{x\to 3} \frac{x^2+x-12}{x^2-9} = \lim\limits_{x\to 3} \frac{(x-3)(x+4)}{(x-3)(x+3)} = \lim\limits_{x\to 3} \frac{x+4}{x+3} = \frac{\lim_{x\to 3}(x+4)}{\lim_{x\to 3}(x+3)} = \frac{7}{6}$.

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2. Determine the infinite limit

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

Solution: For $-2 > x > -3$ we have $x+3 > 0$ but $x+2 < 0$ so for x close to -3 but above it $\frac{x+2}{x+3} < 0$. Also, $\lim_{x\to -3}(x+3) = 0$ and $\lim_{x\to -3}(x+2) = -1 \neq 0$. It follows that $\lim_{x\to -3^+} \frac{x+2}{x+3} = -\infty$.

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3. Let $f(x)$ be such that $x\cos x \leq f(x) \leq x(1+e^x)$ for all $x \geq 0$. Find $\lim\limits_{x\to 0^+} f(x)$.

Solution: $\lim_{x\to 0}(x\cos x) = 0 \cdot \cos 0 = 0$ and $\lim_{x\to 0}\left(x(1+e^x)\right) = 0(1+e^0) = 0$. By the squeeze theorem it follows that $\lim_{x\to 0^+} f(x) = 0$ too.