Common Calculus Mistakes

Limits

The Goal

Find

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

The Mistake

Find the mistake:

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}=\lim_{x\to 3}\frac{(x-3)(x-4)}{x-3}=-4$$

Need a hint? Look carefully at the red parts:

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}=\lim_{x\to 3}\frac{(x-3)(x-4)}{x-3}=-4$$

The Correction

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}=\lim_{x\to 3}\frac{(x-3)(x+4)}{x-3}=\lim_{x\to 3}(x+4)=7$$

An Explanation

The technique of factoring the numerator and then cancelling (which is valid since x is never actually equal to three in the limit computation) is an appropriate strategy. The first mistake was to factor incorrectly. The second mistake was one of *haste*; it appears that the cancellation was done in the student's head and then 0, instead of 3, was substituted for x to arrive at an answer.