Common Calculus Mistakes
Example: l'Hôpital's Rule

Some problems provide the opportunity for more than one mistake.

The Goal

Determine

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

Mistake 1

Find the mistake:

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}\overset{\text{l'H}}{=}\lim_{x\to 3}\frac{2x+1}{x}=\frac{2(3)+1}{3}=\frac{7}{3}$$

Need a hint? Look carefully at the red part:

(The notation "l'H" above the equals sign indicates a step at which l'Hôpital's rule is claimed to be used)

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}\overset{\text{l'H}}{=}\lim_{x\to 3}\frac{2x+1}{x}=\frac{2(3)+1}{3}=\frac{7}{3}$$

Correction 1

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}\overset{\text{l'H}}{=}\lim_{x\to 3}\frac{2x+1}{1}=\frac{2(3)+1}{1}=7$$

Mistake 2

Find the mistake:

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}\overset{\text{l'H}}{=}\lim_{x\to 3}\frac{2x+1}{1}=1$$

Need a hint? Look carefully at the red part:

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}\overset{\text{l'H}}{=}\lim_{x\to 3}\frac{2x+1}{1}=1$$

Correction 2

$$\lim_{x\to 3}\frac{x^2+x-12}{x-3}\overset{\text{l'H}}{=}\lim_{x\to 3}\frac{2x+1}{1}=7$$

Explanations

In the first mistake the derivative of the denominator is computed incorrectly.

In the second mistake the substitution to compute the limit is incorrect (perhaps x=0 was substituted).

Take care to do the simple things correctly.