Common Calculus Mistakes

Quotient Rule

The Goal

Find

$$\frac{d}{dt}\left(\frac{2t-\ln t}{t}\right)$$

The Mistake

Find the mistake:

$$\frac{d}{dt}\left(\frac{2t-\ln t}{t}\right)=\frac{\left(t-\frac{1}{t}\right)t-(2t-\ln t)(1)}{t^2}=\frac{t^2-1-2t+\ln t}{t^2}$$

Need a hint? Look carefully at the red part:

$$\frac{d}{dt}\left(\frac{2t-\ln t}{t}\right)=\frac{\left(t-\frac{1}{t}\right)t-(2t-\ln t)(1)}{t^2}=\frac{t^2-1-2t+\ln t}{t^2}$$

The Correction

$$\frac{d}{dt}\left(\frac{2t-\ln t}{t}\right)=\frac{\left(2-\frac{1}{t}\right)t-(2t-\ln t)(1)}{t^2}=\frac{2t-1-2t+\ln t}{t^2}=\frac{\ln t-1}{t^2}$$

An Explanation

The derivative of 2t was incorrectly computed to be t instead of 2. *Take time to get the simple things correct.*

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