Common Algebra Mistakes
Example: Simplify an Expression

The Goal

Simplify the rational expression:

$$\frac{2(x^2+1)-2x(2x)}{(x^2+1)^2}$$

The Mistake

Find the algebra mistake:

$$\frac{2(x^2+1)-2x(2x)}{(x^2+1)^2}=\frac{2x^2+1-2x^2}{(x^2+1)^2}=\frac{1}{(x^2+1)^2}$$

Need a hint? Look carefully at the red part of the algebra:

$$\frac{2(x^2+1)-2x(2x)}{(x^2+1)^2}=\frac{2x^2+1-2x^2}{(x^2+1)^2}=\frac{1}{(x^2+1)^2}$$

The Correction

$$\frac{2(x^2+1)-2x(2x)}{(x^2+1)^2}=\frac{2x^2+2-4x^2}{(x^2+1)^2}=\frac{2-2x^2}{(x^2+1)^2}=\frac{2(1-x^2)}{(x^2+1)^2}$$

An Explanation

Care is needed when multiplying out expressions. The parentheses indicate that both x^2 and 1 must be multiplied by 2. The two 2s must be multiplied together in the term 2x(2x). Slow down and check your work!

(Tempted to cancel the $(x^2 + 1)$ in the numerator and one of the $(x^2 + 1)$ factors in the denominator? You cannot! To cancel a factor it needs to be a *common factor* of the entire numerator and the entire denominator. In this case $(x^2 + 1)$ is *not* a common factor of the entire numerator)