Examples of Analytical Work with FullSimplify

https://reference.wolfram.com/language/ref/FullSimplify.html

https://reference.wolfram.com/language/ref/Simplify.html

https://reference.wolfram.com/language/tutorial/AlgebraicManipulation.html#31833

https://reference.wolfram.com/language/tutorial/AlgebraicCalculations.html#12157

This is nonsense.

```
In[•]:= FullSimplify[x^n + y^n == z^n, Element[x | y | z | n, Integers] && n > 2 && x y z ≠ 0]
Out[•]=
False
```

Find roots.

```
In[•]:= FullSimplify[x^3 - 6 x^2 + 11 x - 6]
Out[•]=
(-3 + x) (-2 + x) (-1 + x)
```

```
In[•]:= FullSimplify[16 ArcTan[1 / 5] - 4 ArcTan[1 / 239]]
Out[•]=
π
```

```
In[•]:= FullSimplify[E^(EllipticF[x, 1]), -Pi / 2 < x < Pi / 2]
Out[•]=
Sec[x] + Tan[x]
```

Note that only positive roots exist, if you put that as an assumption

```
In[•]:= Simplify[Sqrt[x^2], x > 0]
Out[•]=
x
```

```
In[•]:= Assuming[Re[x] > 0, FullSimplify[E^LogGamma[x]]]
Out[•]=
Gamma[x]
```

Prove that a solution satisfies equation.

```
In[•]:= Solve[x + 2 Exp[x] == 1, x] // Quiet
Out[•]=
{{x → 1 - ProductLog[2 e]}}
```

```
In[•]:= FullSimplify /@ Factor[a^2 q^2 + q^4 (1 + c)^2]
```

Out[•]=

$$q^2 \left(a^2 + (1 + c)^2 q^2\right)$$