A paradox with exponentials

By the Euler formula

$$e = \exp(1 + 2\pi i).$$

Substituting this expression for e into its own RHS, we obtain

$$e = \exp(1+2\pi i) = (\exp(1 + 2\pi i))^{1+2\pi i} = \exp(1+2\pi i)^2 = \exp(1+2\pi i-4\pi^2) = \exp(1-4\pi^2).$$

This implies that $\exp(-4\pi^2) = 1$, which is absurd. This sophism shows that the "rule"

$$(a^b)^c = a^{bc}$$

is not true for complex numbers. They say even Euler himself had difficulties with understanding this.