

Let us begin with

$$e^{2\pi i} = 1.$$

Multiply both sides by e :

$$e^{1+2\pi i} = e. \tag{1}$$

Raise both sides to the power $1 + 2\pi i$:

$$\left(e^{1+2\pi i}\right)^{1+2\pi i} = e^{1+2\pi i}.$$

According to (1), the right hand side equals e , so we write:

$$\begin{aligned} e &= \left(e^{1+2\pi i}\right)^{1+2\pi i} \\ &= e^{(1+2\pi i)^2} \\ &= e^{1+4\pi i-4\pi^2} \\ &= e^{1-4\pi^2}. \end{aligned}$$

Dividing both sides on e we obtain

$$1 = e^{-4\pi^2}.$$

Where is the mistake?