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Hello my friend!

How are you?

You asked me for some help with Euler's Identity. There is a very helpful article about this on Wikipedia. Here is an extract from the Wikipedia page.

Hope this helps.

Kind regards,

Emacksnotes

On Euler's Identity

Euler's identity asserts that $e^{i\pi}$ is equal to 1.

The expression $e^{i\pi}$ is a special case of the expression e^z, where z is any complex number.

In general e^z is defined for complex z by extending one of the definitions of the exponential function from real exponents to complex exponents. One such definition is:

$$e^z = \lim_{n\to\infty}\left(1+\frac{z}{n}\right)^n$$

Euler's identity therefore states that the limit, as n approaches infinity, of $\left(1+\frac{i\pi}{n}\right)^n$ is equal to 1.

Euler's identity is a special case of Euler's formula, which states that for any real number x,

$$e^{ix} \;=\; \cos(x) \;+\; i\;\sin(x)$$

where the inputs of the trigonometric functions sine and cosine are given in radians.

In particular, when $x = \pi$,

$$e^{i\pi} \;=\; \cos\pi \;+\; i\;\sin\pi$$

Since $\cos\pi = -1$ and $\sin\pi = 0$ it follows that

$$e^{i\pi} = -1$$

which yields Euler's identity

$$e^{i\pi} + 1 = 0$$