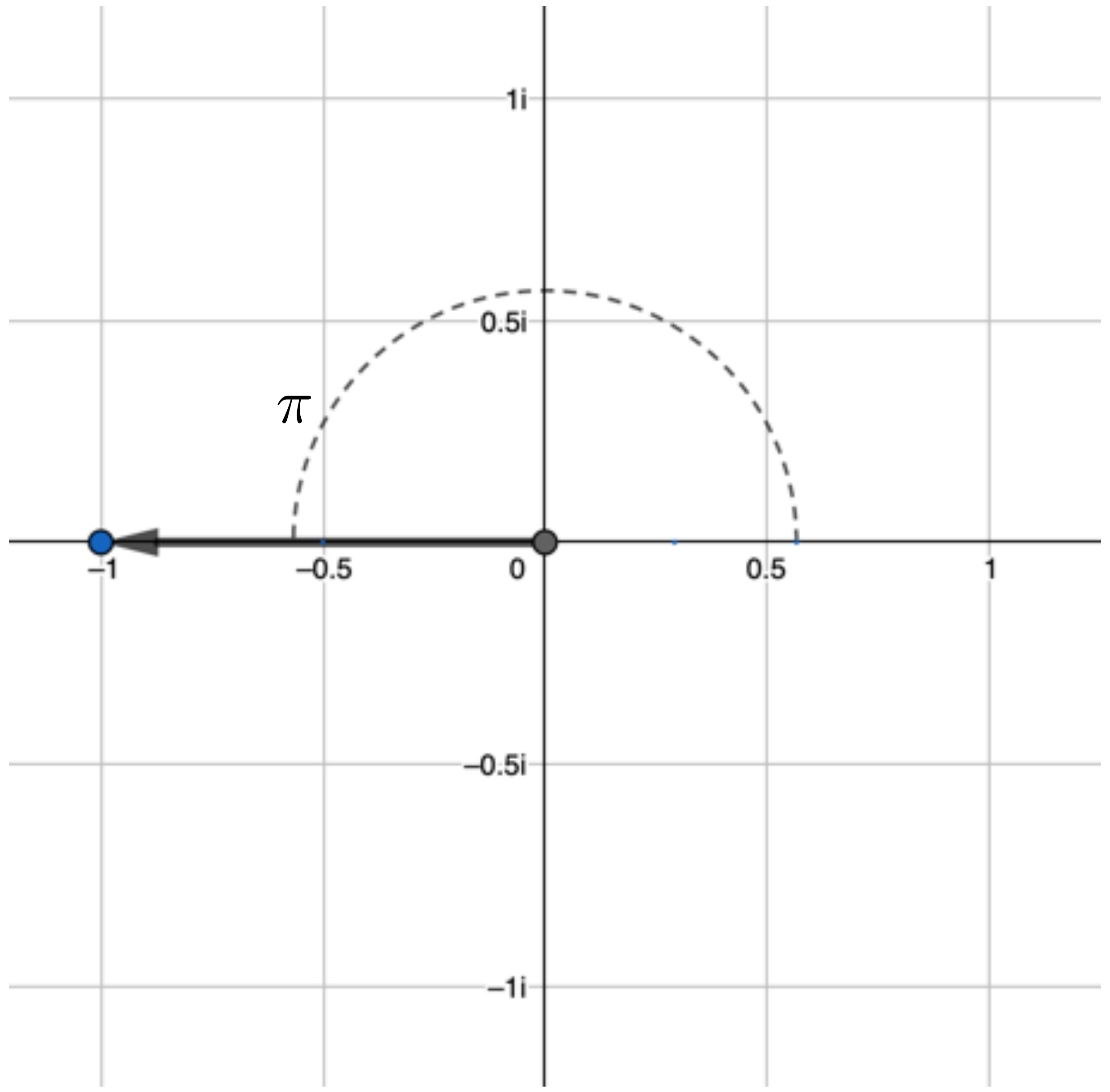
Weirdnesses Left Unaddressed

Hang on though what does $e^{\pi i}$ even mean. Like what does it mean if i is an *exponent*

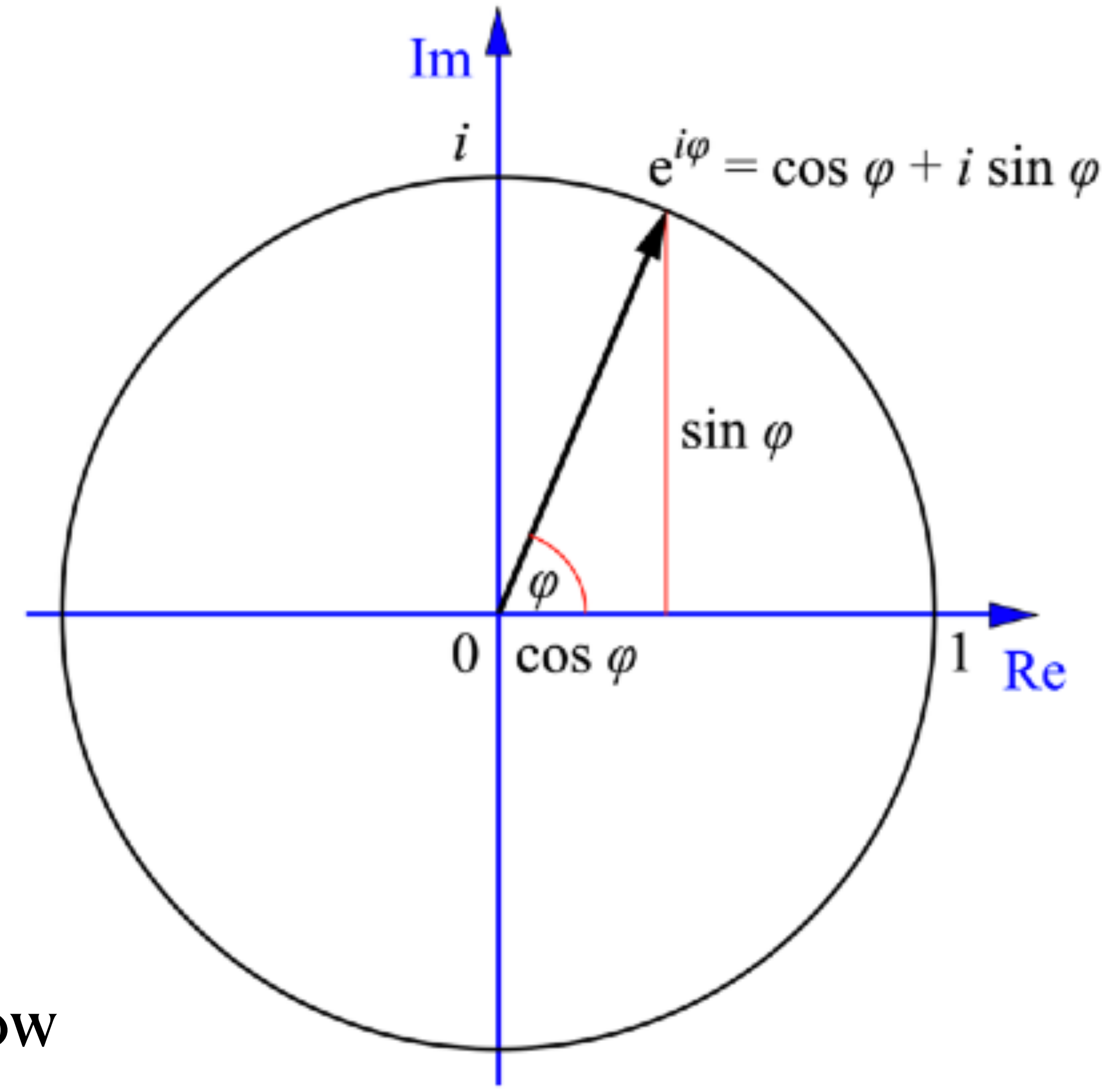
I'm gonna leave that unanswered because there's no intuitive explanation that I'm aware of! But we can reason about it a bit mathematically:

- it needs to act like other exponents. so for example: $\left(2^i\right)^i = 2^{i \cdot i} = 2^{-1} = \frac{1}{2}$ which is kinda weird but ok?
- it *also* needs to still satisfy $f(z) = e^z \Rightarrow f'(z) = e^z$ cause that's kinda *e*'s whole deal

Other Loose Ends



from this you might wonder: if $e^{\pi i} = -1$
then does it work for other radian angles besides π?
yes! euler's identity is actually just a special case of
euler's formula, which says $e^{i\theta}$ is on the unit circle
in the complex plane for any θ!
this is illustrated on the right using an image i swiped from
wikipedia cause im getting tired now



i couldn't figure out a good way to prove or even informally show euler's formula here without having to dip into more calculus than i'd prefer but i like this simple proof if you do know calc

also i don't have any grand finale type thing here because my goal was to keep it as simple as possible while still leaving you with a sense of "wow" or at least "huh" or "that's so weird" even if you didn't understand absolutely everything!