Introduction to Complex Numbers

We know that $(-4)^2 = 16$ and $4^2 = 16$, so what happens when we want to take the square root of a negative number? Until now, we simply left it as "undefined"

Now, we can define a number i that has the property that $i^2 = -1$. Using this, we can now find the square roots of negative numbers in terms of real numbers and i. (i is actually is called an "imaginary" number, but don't let this mislead you – it's as legitimate of a number as 1 or -3)

Example:

Simplify i^9

$$i^9 = i^2 i^2 i^2 i^2 i = (-1)(-1)(-1)(-1)i = i$$

We've simplified this as far as we can.

Example 2:

Find $\sqrt{-49}$

$$\sqrt{-49} = \sqrt{-1}\sqrt{49} = \pm 7i$$

Now, try these questions on your own

1. Find $\sqrt{-9}$

2. Simplify i^3

3. Find $\sqrt{-100}$

4. Find $\sqrt{-a^2}$

5. Simplify i^4

6. Simplify i^5

7. Simplify i^{90}

8. Find $\sqrt{-3}$

9. Find $\sqrt{-25}$

10. Find $\sqrt{-36}$

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