Quantum Computing and Cryptography - 02: Properties of Complex Numbers

Length	Nanomodule
Collection	NSA NCCP
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Academic Levels	Undergraduate, Graduate
Topics	Cryptography, Quantum Computing
Link	https://clark.center/details/aparakh/193110f5-480e-4e58-a043-1f5e52184532

Description

This lesson continues to review the complex numbers background that students need for quantum computing and cryptography. In this lesson students will learn to represent complex numbers as ordered pairs, more basic operations of complex numbers, compute the modulus and conjugate of complex numbers and their properties. Students will also write programs for various complex number operations they learn.

Email Dr. Abhishek Parakh at aparakh@unomaha.edu for solutions to the problems.

Note: To get started with Jupyter notebooks please follow the userguide available at: https://sites.google.com/unomaha.edu/userguideqcl/

Outcomes

- Express complex numbers as ordered pairs.
- Analyze some of the basic properties of complex numbers and operations on them.
- Calculate the modulus and conjugate of complex numbers.
- Prove basic properties of modulus and conjugate operations.
- Implement programs to divide two complex numbers, compute the modulus and conjugate.

Alignment

The standards and guidelines this learning object is mapped to

- CAE Cyber Ops (2014) - Discrete Math: Given an algorithm determine the complexity of the algorithm and cases in which the algorithm would/would not provide a reasonable approach for solving a problem
- NICE Workforce Knowledge (2017) - K0052: Knowledge of mathematics (e.g. logarithms, trigonometry, linear algebra, calculus, statistics, and operational analysis).
- CAE Cyber Defense (2014) - Programming: Students will be able to demonstrate proficiency in the use of a programming language to solve complex problems in a secure and robust manner.

Links

External links that are associated with this learning object

- User guide