

Quantum Computing @ MEF

TPC-2

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Consider the Boolean formula $\varphi = A \wedge (\neg B \vee C)$. Can we assign values to variables A , B and C such that φ is true? Such a question is an instance of the *Satisfiability Problem* [ST13]. The latter appears frequently across different domains, from theorem proving to software verification, cryptography, and artificial intelligence – it is, in fact, one of the most discussed problems in Computer Science.

The goal of this assignment is to write an essay (around 5 pages) that discusses how Grover’s algorithm [NC16] can be used to tackle the Satisfiability problem. Among other things, we will value essays whose claims and ideas are tested and illustrated via implementations in `Qiskit`.

What to submit: The report in PDF and if applicable your `Qiskit` implementations. Please send by email (nevrenato@di.uminho.pt) a unique zip file with the name “qc2122-N.zip”, where “N” is your student number. The subject of the email should be “qc2122 N TPC-2”.

References

- [NC16] Michael A. Nielsen and Isaac L. Chuang. *Quantum Computation and Quantum Information (10th Anniversary edition)*. Cambridge University Press, 2016.
- [ST13] Uwe Schöning and Jacobo Torán. *The Satisfiability Problem: Algorithms and Analyses*, volume 3. Lehmanns Media, 2013.