

# Quantum Information A    Fall 2020    Problem Set 4

Solutions are due in 4 pm on Tuesday Sep 29.

All problems except #5 are taken from Nielsen-Chuang, look them up from the book.

1. Exercise 2.67 from the book. (It may be useful to think that  $V$  can be written as the direct sum of  $W$  and its orthogonal complement,  $V = W \oplus W_{\perp}$ .)
2. Exercise 2.72 from the book.
3. Exercise 2.73 from the book.
4. Exercise 2.75 from the book.
5. Exercise 2.79 from the book.
6. Exercise 2.82 from the book.
7. Voluntary problem: Exercise 3.2 from the book. Do not hand in a solution, but just think about it. You may wish to google for "Turing number" or "Description number + Turing machine" for hints. I am not sure how useful the hint in the book is...?